UNIVERSITY OF ILLINOIS ENGINEERING EXPERIMENT STATION CIRCULAR NO. 66

# The Axial Variation of the Magnetic Field in Solenoids of Finite Thickness

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# THE AXIAL VARIATION OF THE MAGNETIC FIELD IN SOLENOIDS OF FINITE THICKNESS

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CONTENTS



FIGURES



TABLES

## 1. INTRODUCTION.

The following tables are a by-product of recent experience at this institution in the design of solenoids and also the circumstance that the University of Illinois high speed digital computer, the Illiac, has been available to us. They have been compiled as an aid to the design of solenoids in which the effect on the magnetic field arising from the finite cross-sectional dimensions of the windings must be considered.

There is no shortage of ways to calculate the effect of winding thickness on the magnetic field of a solenoid. However, from the point of view of the practical designer all methods have in common the fact that they require a large amount of computation if a fair picture of the resulting magnetic field is desired. These tables represent a frankly empirical approach to this problem. Using the computer facility, a function for the thickness correction has been tabulated for a wide range of solenoid lengths and cross-sectional dimensions. Within the range of tabulated values (which is believed to cover the majority of laboratory situations) the designer can obtain very detailed information about the magnetic field and the effect of winding thickness with practically no calculation at all. The tables should also prove valuable in giving a quantitative impression of the importance of the thickness correction for increasing thickness of winding as well as for position along the axis.

It is a pleasure to acknowledge the important contributions of Mr. C. T. Sah who numerically checked selected values of the machine computations and Mrs. M. Huse who aided in the prepara- of the tabular stencils.

## 2. CONSTRUCTION OF THE TABLES.

The construction of these tables can be described by considering one of the tabulated cases--the long solenoid. It is desired to compute the magnetic field along the axis of a solenoid whose windings can be considered as uniformly distributed within a rectangular cross-sectional area. If an origin of coordinates is chosen at the midpoint of the axis of the solenoid, the magnetic field at any point on the axis can be expressed by elementary means as an integral over the cross-sectional area of the windings. This integral can be evaluated in closed form and the resulting expression (called hereafter $H_a$) written in terms of the position of the point on the axis and the dimensions of the windings.

The function $H_a$ is a fairly lengthy expression to evaluate numerically but to a first approximation it is equivalent to the familiar expression for the axial magnetic field of an ideal solenoid (i.e. a solenoid having windings of infinitesimal thickness). The expression for the ideal solenoid is substantially easier to use in calculation thus suggesting the following procedure. For every thick solenoid of rectangular cross-section define an "equivalent" ideal solenoid as one having a length equal to that of the thick solenoid, a radius of windings equal to the mean radius of the thick solenoid, a current density (per unit length of windings) equal to that of the thick solenoid, and zero winding thickness (see figure 1). Let $H_a$ denote the magnetic field strength at a point on the axis of the thick

solenoid and let $H_i$ denote the magnetic field strength at the same point on the axis of the equivalent ideal solenoid. If values of the ratio $H_a/H_i$ are available it is then possible to calculate the magnetic field on the axis of a thick solenoid by using the relatively simple expression for $H_i$ and multiplying the result by the appropriate expression for $H_a/H_i$ at the desired point. This becomes a possible and simple procedure using these tables which give the ratio $H_a/H_i$ tabulated according to thickness, length, and position along the axis of thick solenoid.

The tabulated values are arranged in three groups: long solenoids, short solenoids, and loops. In every instance only systems having rectangular winding cross-sections were considered. As the names suggest, long and short solenoid tabulations differ only in the length of windings relative to the mean radius. The dividing line between long and short solenoids was arbitrarily chosen and had to do with the fact that certain ranges of relative length were of special interest to us. Nevertheless, it will be found that a fairly extensive range of relative lengths has been tabulated.

The loop tabulation follows the same pattern described above. Loops are defined for the present purposes as thick winding elements of square cross-section which is just a special case so far as the formula for $H_a$ is concerned. The "equivalent" ideal loop used in calculating the $H_a/H_i$ ratio is a loop of infinitesimal thickness, carrying the same current as the thick loop, and situated at the geometric center of the cross-section of the thick loop (see figure 2).

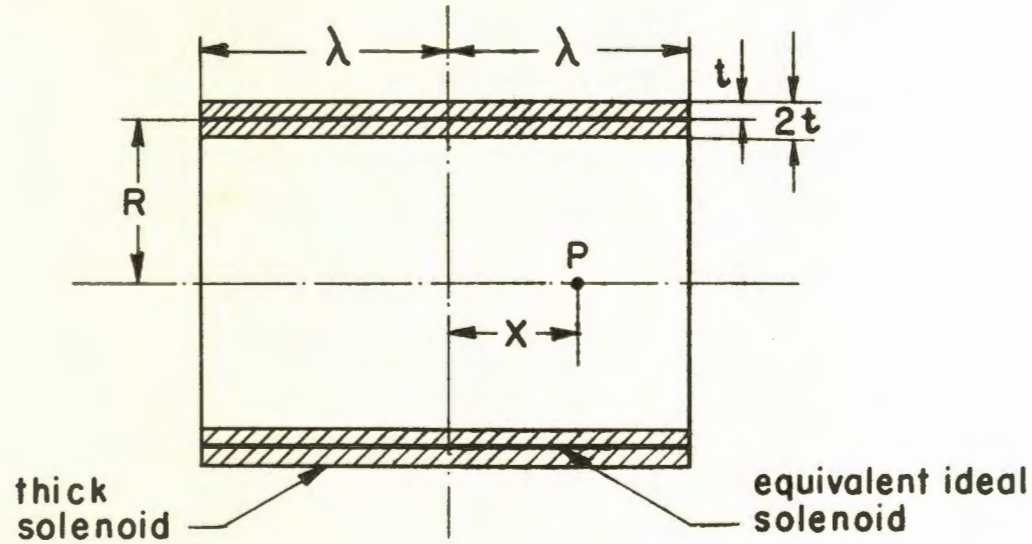


Figure 1. Illustrating the Definition of Equivalent Ideal Solenoid

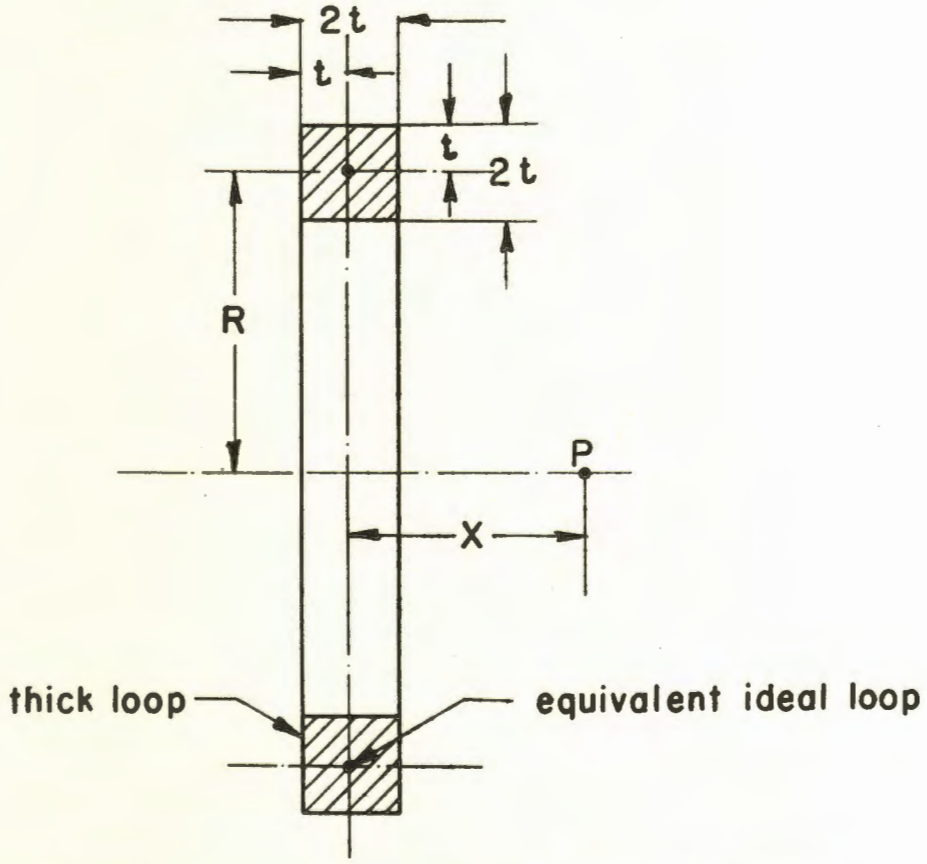


Figure 2. Illustrating the Definition of Equivalent Ideal Loop

In addition to the $H_a/H_i$ ratios, tabulations are also given of the magnitude of the axial magnetic field as a function of position along the axis for ideal solenoids of various lengths and for ideal loops. An information sheet summarizing the calculation and giving directions for reading precedes each section of the tables.

The calculation of the tables was done by programming the operations indicated on the information sheets for the digital computer. The computation was laid out so that the answers were automatically printed in tabular form on stencils for duplication, thus eliminating the chance of human stenographic error. The values in the table have been checked by comparison with several dozen hand-computed values selected at random throughout the tables. All computations were carried out internal to the Illiac to a precision of twelve decimals. They were printed to a rounded six figure precision since the assumptions and formulae used probably do not describe any conceivable physical coil to any greater accuracy. Since the entire computation was carried out twice at widely separated times with complete agreement, and since the hand computed values checked wherever carried out, it is assumed that the programming of the problem for the computer was free from gross error, and that the Illiac made no random errors during the running of the problem.

In applying the tables to the calculation of actual thick solenoid elements the accuracy of the results will be determined more by departures of the actual winding elements from the

assumed conditions than by the limit of error of the calculations. It should not be forgotten that the representation of a thick winding element which was chosen for the purpose of calculation is itself an idealization which ignores the possiblity of voids in the winding cross-section and uncertainties in the margins which will be present in an actual winding. It has been our experience that such effects are unimportant for field calculations up to a precision of 1 part in 1,000.

All of the values in these tables refer to points on the axis of the winding element and no attempt has been made to calculate off-axis values. To include off-axis values would considerably increase the calculational work without (for our purposes at least) a commensurate gain in useful design information. Persons interested in off-axis values or in a more general approach to the calculation of solenoids should refer to the recent work of M. W. Garrett, Axially Symetric Systems for Generating and Measuring Magnetic Fields.[1]

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1 M. W. Garrett, Part I, J. Appl. Phys. 22, 1091 (1951); Part II to be published.

## 3. FORMULAE USED IN THE TABULATION

### A. Units

The next three sections contain formulae which give the axial magnetic field for some cylindrical current configurations. These formulae have been expressed in the units which we find most convenient for design calculations. The following units are employed:

Current - practical amperes

Length - centimeters

Magnetic Field Intensity - gauss

The tabulated values are independent of the system of units employed since (as shown in sections E, F, and G) they are dimensionless ratios in all cases. However, explicit mention of units is made here for the benefit of the reader who may find it convenient to refer to some of these formulae for design calculations.

### B. Ideal Circular Loop

We start with the formula for the magnetic field on the axis of an ideal* circular loop (see figure 3).

$$H_i = \frac{\pi I R \sin \alpha}{5 s^2} \qquad (1)$$

where: I = current flowing in the loop
R = radius of the loop
$\alpha$ = angle subtended by R at the axial point P
s = distance between P and a point on the loop
$H_i$ = magnetic field at point P

* Wherever the word ideal is used to describe a current element it will be understood that the thickness of the winding element is infinitesimal in comparison with its radius.

Equation (1) can be found in any good sophomore physics text (except for the constant of proportionality which depends upon the system of units employed).

C. Ideal Solenoid

The magnetic field at a point P on the axis of an ideal solenoid can be obtained from (1). The solenoid can be regarded as constructed of a large number of ideal loops uniformly spaced to form a cylinder. Integration of (1) with respect to $\alpha$ between the limits $\alpha_1$ and $\alpha_2$ (see figure 4) yields the following equation:

$$H_i = \frac{\pi}{5} j_\lambda (\cos \alpha_1 - \cos \alpha_2) \qquad (2)$$

where $j_\lambda$ = current per unit length in the solenoid

$\alpha_1$, $\alpha_2$ = angles subtended by the ends of the solenoid (see figure 4).

$H_i$ = magnetic field at point P

It will be convenient to have an expression in terms of the total current I flowing in the solenoid:

since $I = 2\lambda j_\lambda$ we can write

$$H_i = \frac{\pi I}{10\lambda} (\cos \alpha_1 - \cos \alpha_2) \qquad (3)$$

D. Thick Circular Current Element

The case of a thick circular current element (called hereafter TCE) will now be considered. Discussion will be limited to windings having rectangular cross-sectional area. It is further assumed that the current is uniformly distributed over the winding cross-section. The case is illustrated in figure 5

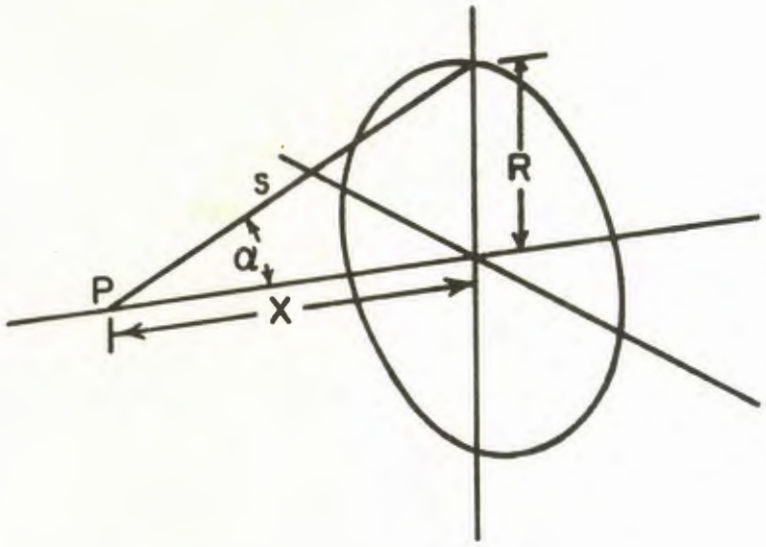


Figure 3. Ideal Circular Loop

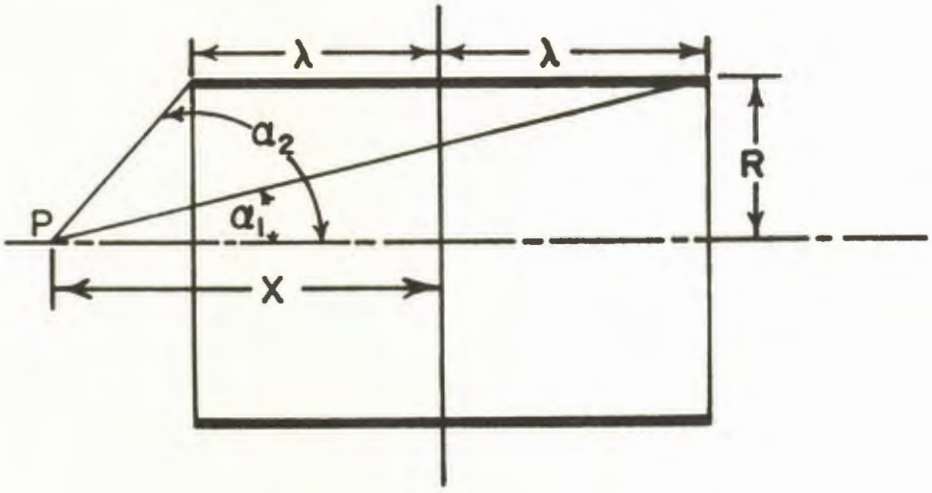


Figure 4. Ideal Thin Solenoid

whereon the various dimensions are shown. A formula can be obtained using equation (2).

The magnetic field at an axial point P due to the TCE can be imagined to be the integrated contributions of infinitesimally thin solenoidal elements such as dA for which the results of (2) are valid. Treating dA as an ideal solenoid we see:

$$j_\lambda = j\,dy \tag{4}$$

where: j = current density in the TCE

dy = thickness of dA

and substituting in (2)

$$dH_a = \frac{\pi}{5} j(\cos \alpha_1(y) - \cos \alpha_2(y)) \tag{5}$$

this being the contribution to the magnetic field at P due to the element dA. The total field at P is obtained by integrating (5) between the limits y = (R-t) and y = (R+t). The integration produces some fairly lengthy algebraic expressions and in the interest of compactness the results will be written in terms of some new parameters whose signifigance is illustrated in figure 6. The expression for $H_a$ is

$$H_a = \frac{\pi}{5} j \left[(X+\lambda) \ln \frac{(M+t+R)}{(N-t+R)} - (X-\lambda) \ln \frac{(O+t+R)}{(P-t+R)}\right] \tag{6}$$

By referring to figure 6 it can be seen that:

$$\begin{aligned} M^2 &= (X+\lambda)^2 + (R+t)^2 \\ N^2 &= (X+\lambda)^2 + (R-t)^2 \\ O^2 &= (X-\lambda)^2 + (R+t)^2 \\ P^2 &= (X-\lambda)^2 + (R-t)^2 \end{aligned} \tag{7}$$

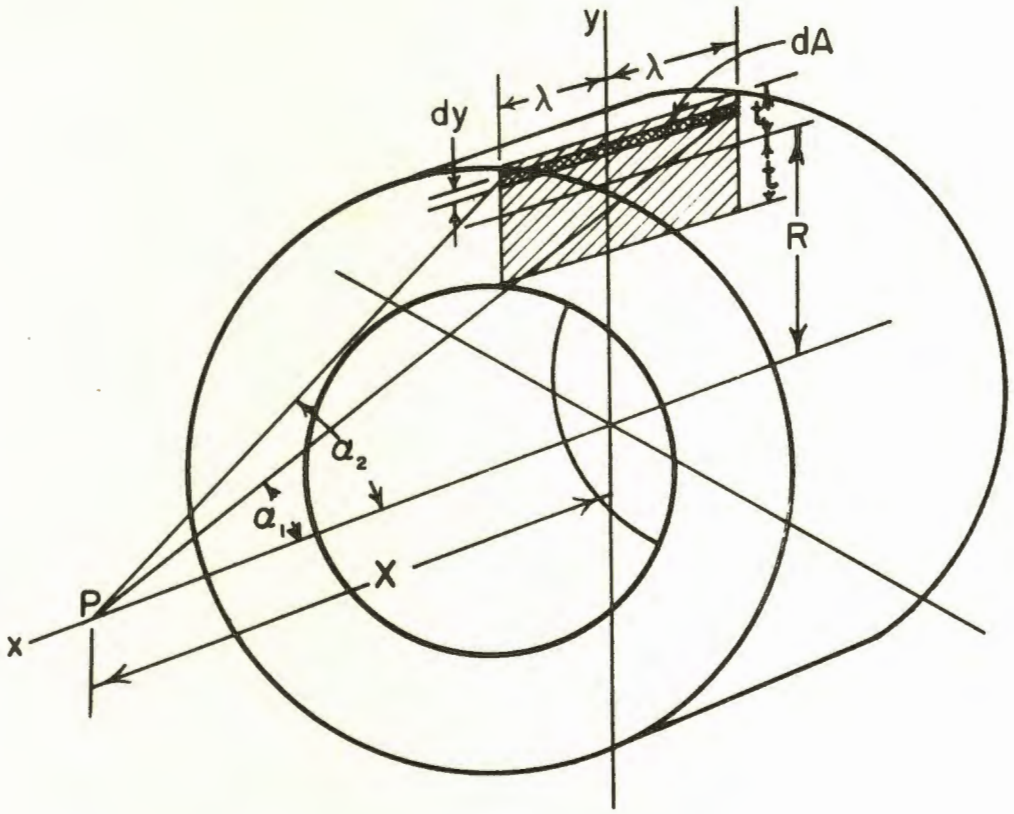


Figure 5. Thick Circular Current Element (TCE)

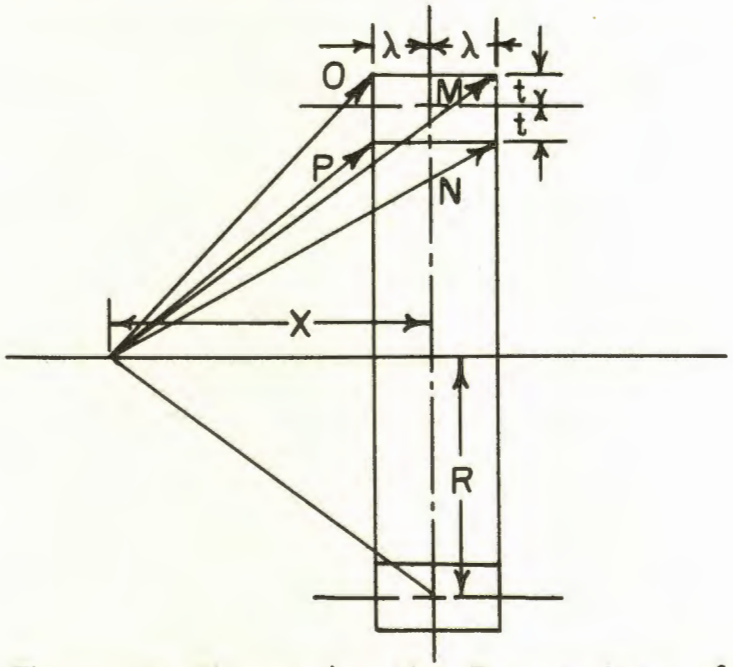


Figure 6. Illustrating the Parameters of Equation (6)

The quantities X,R,λ, and t are clearly identified on figure 6. Equation 6 is a general expression which can be used to calculate the magnetic field at any point on the axis of a thick circular current element provided it is rectangular in cross-section. There are no special restrictions upon the relative magnitudes of the radius, length, or thickness. This is the basic formula used in the calculation of the tables. Depending upon the relative magnitudes of R,λ, and t one can calculate the properties of solenoids, loops, or flattish windings as will be shown presently.

For the purposes of these tables all geometrically similar current elements are considered equivalent and so it is advantageous to express all dimensions in relative coordinates. This is done by expressing all lengths in terms of the radius R. The new coordinates are defined as follows

$$p = \frac{X}{R} = \text{position coordinate}$$

$$L = \frac{\lambda}{R} = \text{length coordinate} \qquad (8)$$

$$T = \frac{t}{R} = \text{thickness coordinate}$$

Substituting these expressions in (7) gives

$$\begin{aligned} M^2 &= R^2\left[(p+L)^2 + (1+T)^2\right] \\ N^2 &= R^2\left[(p+L)^2 + (1-T)^2\right] \\ O^2 &= R^2\left[(p-L)^2 + (1+T)^2\right] \\ P^2 &= R^2\left[(p-L)^2 + (1-T)^2\right] \end{aligned} \qquad (9)$$

and (6) becomes

$$H_a = \frac{\pi j R}{5} F(p,L,T) \qquad (10)$$

where

$$F(p,L,T) = \left\{(p+L)\ln\frac{\left[(p+L)^2+(1+T)^2\right]^{1/2}+T+1}{\left[(p+L)^2+(1-T)^2\right]^{1/2}-T+1} - (p-L)\ln\frac{\left[(p-L)^2+(1+T)^2\right]^{1/2}+T+1}{\left[(p-L)^2+(1-T)^2\right]^{1/2}-T+1}\right\} \quad (11)$$

E. Thick Solenoid Ratios

As explained in section 2 the values tabulated are ratios of the field produced at an axial point by an "actual" or thick element ($H_a$) to the field produced at the same point by the equivalent ideal element ($H_i$).* An equivalent ideal element is defined in the case of solenoids as one satisfying the following conditions ( also see figure 1 ).

a) Its thickness is negligible in comparison with its radius.

b) Its length is equal to the length of the actual solenoid.

c) Its radius is equal to the mean radius of the actual solenoid.

d) The total currents circulating in the ideal and actual solenoid are equal.

The appropriate formula for $H_i$ in this case is clearly (3) but for the purpose of computation of $H_a/H_i$ it is required that:

(i) Equation (3) must be expressed in the same coordinates as (10).

* For conciseness we shall designate this ratio as Qs, the subscript s referring to the fact that this is a solenoid ratio. The corresponding ratio for the case of thick loops will be called $Q_\lambda$ (see next section).

(ii) The expressions for $H_a$ and $H_i$ must relate to elements carrying equal total currents.

In converting (3) to relative coordinates (8) we note

$$\cos \alpha_1 = \frac{(X+\lambda)}{[(x+\lambda)^2 + R^2]^{1/2}} \equiv \frac{(p+L)}{[(p+L)^2 + 1]^{1/2}}$$

$$\cos \alpha_2 = \frac{(X-\lambda)}{[(X-\lambda)^2 + R^2]^{1/2}} \equiv \frac{(p-L)}{[(p-L)^2 + 1]^{1/2}}$$

and finally

$$H_i = \frac{\pi I}{10RL} G(p,L) \tag{12}$$

where

$$G(p,L) = \frac{(p+L)}{[(p+L)^2 + 1]^{1/2}} - \frac{(p-L)}{[(p-L)^2 + 1]^{1/2}} \tag{13}$$

It is easy to express (10) in terms of the total current I by noting that

$$j = \frac{I}{4\ t\lambda} = \frac{I}{4\ R^2TL} \tag{14}$$

so that the result is

$$Q_s = \frac{H_a}{H_i} = \frac{1}{2T} \frac{F(p,L,T)}{G(p,L)} \tag{15}$$

Values for $Q_s$ have been tabulated for a range of values of p,L, and T. The values have been grouped into two tables, one called long solenoids, Table I-A, and the other called short solenoids, Table II-A.

F. Thick Loop Ratios

A calculation similar to the one described above for thick solenoids was also made for thick loops of square cross-section. The ideal element in this case is a circular loop situated at

the center of the cross-section of the thick loop (see figure 2) and carrying the same current. The required formula for $H_i$ in this case is (1) except that it must be rewritten in reduced coordinates. Rewriting (1) in terms of R and X and substituting from (8) gives

$$H_i = \frac{\pi}{5} IR^{1/2} J(p) \tag{16}$$

where:

$$J(p) = \frac{1}{(1+p^2)^{3/2}} \tag{17}$$

An expression for the axial field of a thick loop is readily obtained from (10) by letting L = T and using (14) to assure the equality of total current I in the ideal and actual elements

$$H_a = \frac{\pi I}{2CRT^2} F^*(p,T) \tag{18}$$

where $F^*(p,T) = F(p,T,L)_{T=L}$

The loop ratio is then

$$Q_\lambda = \frac{H_a}{H_i} = \frac{1}{4R^{3/2}T^2} \frac{F^*(p,T)}{J(p)} \tag{19}$$

and values of this function are given in table III-A for a range of values of p and T.

G. Magnetic Field vs. Axial Position for Ideal Elements

From the foregoing discussions it is evident that while the Q values tabulated in tables I-A, II-A, and III-A are useful in determining deviations of thick winding elements from ideal elements, they give no direct assistance in determining the actual magnitude of the magnetic field at an axial point. For the later purpose supplementary tables have been prepared

giving the values of the magnetic field for an ideal element along the axis of the element.

The construction of these supplementary tables can be described by considering Table I-B (the supplement of Table I-A). In this table the magnetic field is given for an ideal long solenoid as a function of solenoid length and axial displacement from the center of the element. The function tabulated is the ratio of the field at the desired axial point to the value of the field at the center of the element. From equations (12) and (13) this function is seen to be

$$U_S = \frac{H_i}{(H_i)_{p=o}} = \frac{G\,(p,L)}{G\,(o,L)} \qquad (20)$$

In Table I-B this function is tabulated for the same values of p and L as occurred in Table I-A.

Table II-B contains values of (20) for values of p and L which are the same as those used in Table II-A.

Table III-B is analogous to tables I-B and II-B except that it is for the case of an ideal loop. The function tabulated is (see equation 16)

$$U_\lambda = \frac{H_i}{(H_i)_{p=o}} = \frac{J\,(p)}{J\,(o)} = 2^{2/3} J(p) \qquad (21)$$

This function is tabulated for the same values of p as occur in Table III-A.

The information tabulated in the A and B tables should make possible a straightforward and speedy determination of the axial fields in thick solenoids in terms of easily computed quantities.

H. Use of the Tables

Each table is preceded by information sheets summarizing the contents of the table and giving directions for reading the tables.* We believe that the data have been arranged in a straightforward and comprehensible way. However, the arrangement of the data is not the same in all the tables. To avoid confusion the reader should study the information sheets for the desired table before attempting to use the table.

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*The user of these tables will note that the tabulated values of the length parameter L do not always increase by uniform increments, there being a considerably higher than average density of L values in certain narrow ranges. (For example in Table I-A the range of L from 0.855 to 0.875 contains five values.) Since this circumstance may seem peculiar to some readers the following explanatory (or historical) remark seems appropriate.

As mentioned in the introduction, the tables are an outgrowth of some design calculations. The design problem was the practical application of two new solenoid systems which were recently described by M.W. Garrett. These new systems (called by Garrett "sixth-order" and "eight-order solenoids") are characterized by unusually homogeneous fields and relative simplicity of construction. [Persons desirous of producing highly homogeneous magnetic fields over regions comparable to the winding volume should find Garrett's systems of considerable interest. They are described in Garrett's paper, Part I, Journal of Applied Physics, 22, 1091 (1951).] They are, for instance, considerably better in homogeneity of field than the well-known Helmholtz Pair. The regions of L in which the clustering of values occurs corresponds to the critical L values characteristic of the winding elements which make up the sixth- and eighth-order systems of Garrett. The inclusion of several values of L near the critical Garrett parameters was done with the intention of reducing the amount of interpolation necessary for treating these special systems. Actually, as inspection of the tables will show, the function $Q_s$ is rather insensitive to the value of L, there being some instances in which appreciable variation of $Q_s$ with L occurs only for the largest values of the thickness parameter T. A coarser variation of L would be entirely satisfactory for most practical purposes.

These explanatory comments should in no sense be construed to mean that the utility of these tables is limited to analysis of the special Garrett solenoids. The range of L values starts below and extends considerably above the critical parameters of the Garrett designs. Throughout this range values accurate to at least five decimal places are possible by interpolation.

## TABLE I-A LONG SOLENOID RATIOS

Values of $Q_s$ calculated from (15) are tabulated for the following relative dimensions (see section 3D and 3E for discussion).

Length Parameter $L = \lambda/R$ takes the following values.

| | | | | | |
|---|---|---|---|---|---|
| 0.855 | 1.300 | 1.390 | 1.700 | 1.826 | 6.000 |
| 0.860 | 1.350 | 1.393 | 1.816 | 1.828 | 7.000 |
| 0.865 | 1.380 | 1.395 | 1.818 | 2.000 | 8.000 |
| 0.870 | 1.383 | 1.398 | 1.820 | 3.000 | 9.000 |
| 0.875 | 1.385 | 1.400 | 1.822 | 4.000 | 10.000 |
| 1.000 | 1.388 | 1.500 | 1.824 | 5.000 | |

Thickness Parameter $T = t/R$ takes the following values for each value of L.

| | |
|---|---|
| 0.010 | 0.060 |
| 0.015 | 0.080 |
| 0.020 | 0.100 |
| 0.025 | 0.150 |
| 0.030 | 0.200 |
| 0.040 | 0.250 |

Position Parameter $p = X/R$. In this table $Q_s$ is calculated at 17 points equi-spaced along the axis from the center to the end of the solenoid for each pair of L and T values. Since the p value in this case depends upon L the tabulated values are identified by an index n which runs consecutively from 00 through 16 and is related to p by the equation $p = \frac{nL}{16}$.

---

NOTE: The quantities X,R,t, and $\lambda$ are the actual dimensions of the solenoid (see figure 1).

EXAMPLE: Given a solenoid having the following dimensions:

Total length = 40 cm

Outside diameter = 22 cm

Inside diameter = 18 cm

Find $Q_s$ at a point P on the axis of this solenoid and located 15 cm from the center.

From the given dimensions:

Mean radius $R = 10$ cm

Half-length $\lambda = 20$ cm

Half-thickness $t = 1$ cm

Axial displacement $X = 15$ cm

Therefore: $L = \lambda/R = 2$

$T = t/R = 0.100$

$p = X/R = 1.5$

$n = \frac{16p}{L} = \frac{16(1.5)}{2} = 12$

To find value turn to page headed 2.000. Look in row 12 of column headed 0.100. The value of $Q_s$ is 1.000527. In other words, for a thick solenoid of this geometry and at the axial point P specified, the magnetic field is 0.0527% greater than the field produced at the same point by the equivalent ideal solenoid.

## TABLE I-A LONG SOLENOID RATIOS

L = 0.855

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000064 | 1.000113 |
| 01 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000064 | 1.000113 |
| 02 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000064 | 1.000115 |
| 03 | 1.000007 | 1.000016 | 1.000029 | 1.000046 | 1.000066 | 1.000117 |
| 04 | 1.000007 | 1.000017 | 1.000030 | 1.000047 | 1.000067 | 1.000119 |
| 05 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000122 |
| 06 | 1.000008 | 1.000017 | 1.000031 | 1.000048 | 1.000070 | 1.000124 |
| 07 | 1.000008 | 1.000018 | 1.000031 | 1.000049 | 1.000070 | 1.000125 |
| 08 | 1.000008 | 1.000017 | 1.000031 | 1.000049 | 1.000070 | 1.000124 |
| 09 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000121 |
| 10 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000065 | 1.000115 |
| 11 | 1.000007 | 1.000015 | 1.000026 | 1.000041 | 1.000059 | 1.000105 |
| 12 | 1.000006 | 1.000013 | 1.000023 | 1.000036 | 1.000051 | 1.000091 |
| 13 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000072 |
| 14 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000027 | 1.000047 |
| 15 | 1.000001 | 1.000003 | 1.000004 | 1.000007 | 1.000010 | 1.000018 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999991 | 0.999984 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 1.000254 | 1.000451 | 1.000704 | 1.001577 | 1.002787 | 1.004323 |
| 01 | 1.000255 | 1.000453 | 1.000706 | 1.001583 | 1.002799 | 1.004342 |
| 02 | 1.000258 | 1.000458 | 1.000715 | 1.001602 | 1.002834 | 1.004398 |
| 03 | 1.000262 | 1.000466 | 1.000727 | 1.001631 | 1.002888 | 1.004486 |
| 04 | 1.000268 | 1.000476 | 1.000743 | 1.001667 | 1.002954 | 1.004594 |
| 05 | 1.000273 | 1.000486 | 1.000759 | 1.001705 | 1.003023 | 1.004709 |
| 06 | 1.000278 | 1.000495 | 1.000773 | 1.001737 | 1.003084 | 1.004812 |
| 07 | 1.000281 | 1.000499 | 1.000780 | 1.001756 | 1.003122 | 1.004879 |
| 08 | 1.000280 | 1.000497 | 1.000777 | 1.001751 | 1.003119 | 1.004884 |
| 09 | 1.000273 | 1.000486 | 1.000760 | 1.001714 | 1.003056 | 1.004795 |
| 10 | 1.000260 | 1.000462 | 1.000722 | 1.001631 | 1.002913 | 1.004579 |
| 11 | 1.000237 | 1.000422 | 1.000661 | 1.001493 | 1.002670 | 1.004206 |
| 12 | 1.000205 | 1.000365 | 1.000570 | 1.001290 | 1.002311 | 1.003646 |
| 13 | 1.000161 | 1.000287 | 1.000449 | 1.001017 | 1.001824 | 1.002882 |
| 14 | 1.000106 | 1.000189 | 1.000296 | 1.000671 | 1.001204 | 1.001906 |
| 15 | 1.000040 | 1.000071 | 1.000112 | 1.000253 | 1.000456 | 1.000724 |
| 16 | 0.999964 | 0.999936 | 0.999900 | 0.999773 | 0.999594 | 0.999360 |

## TABLE I-A LONG SOLENOID RATIOS

L = 0.860

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000007 | 1.000016 | 1.000028 | 1.000043 | 1.000062 | 1.000111 |
| 01 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000063 | 1.000111 |
| 02 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000063 | 1.000113 |
| 03 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000065 | 1.000115 |
| 04 | 1.000007 | 1.000017 | 1.000029 | 1.000046 | 1.000066 | 1.000117 |
| 05 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000120 |
| 06 | 1.000008 | 1.000017 | 1.000031 | 1.000048 | 1.000069 | 1.000122 |
| 07 | 1.000008 | 1.000017 | 1.000031 | 1.000048 | 1.000070 | 1.000124 |
| 08 | 1.000008 | 1.000017 | 1.000031 | 1.000048 | 1.000069 | 1.000123 |
| 09 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000121 |
| 10 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000065 | 1.000115 |
| 11 | 1.000007 | 1.000015 | 1.000026 | 1.000041 | 1.000059 | 1.000105 |
| 12 | 1.000006 | 1.000013 | 1.000023 | 1.000035 | 1.000051 | 1.000091 |
| 13 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 14 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000047 |
| 15 | 1.000001 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000018 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999991 | 0.999984 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000250 | 1.000443 | 1.000692 | 1.001551 | 1.002741 | 1.004250 |
| 01 | 1.000251 | 1.000445 | 1.000695 | 1.001557 | 1.002753 | 1.004270 |
| 02 | 1.000254 | 1.000451 | 1.000703 | 1.001577 | 1.002789 | 1.004328 |
| 03 | 1.000258 | 1.000459 | 1.000717 | 1.001607 | 1.002844 | 1.004418 |
| 04 | 1.000264 | 1.000469 | 1.000733 | 1.001644 | 1.002913 | 1.004530 |
| 05 | 1.000270 | 1.000480 | 1.000750 | 1.001684 | 1.002986 | 1.004650 |
| 06 | 1.000275 | 1.000489 | 1.000764 | 1.001718 | 1.003051 | 1.004759 |
| 07 | 1.000278 | 1.000495 | 1.000773 | 1.001739 | 1.003093 | 1.004833 |
| 08 | 1.000278 | 1.000494 | 1.000771 | 1.001738 | 1.003095 | 1.004846 |
| 09 | 1.000271 | 1.000483 | 1.000755 | 1.001703 | 1.003037 | 1.004764 |
| 10 | 1.000258 | 1.000460 | 1.000719 | 1.001623 | 1.002898 | 1.004557 |
| 11 | 1.000236 | 1.000421 | 1.000658 | 1.001487 | 1.002660 | 1.004190 |
| 12 | 1.000204 | 1.000363 | 1.000569 | 1.001286 | 1.002304 | 1.003636 |
| 13 | 1.000161 | 1.000286 | 1.000448 | 1.001014 | 1.001819 | 1.002875 |
| 14 | 1.000106 | 1.000188 | 1.000295 | 1.000668 | 1.001200 | 1.001900 |
| 15 | 1.000040 | 1.000070 | 1.000110 | 1.000250 | 1.000451 | 1.000716 |
| 16 | 0.999963 | 0.999935 | 0.999898 | 0.999769 | 0.999586 | 0.999348 |

## TABLE I-A LONG SOLENOID RATIOS

L = 0.865

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000007 | 1.000015 | 1.000027 | 1.000043 | 1.000061 | 1.000109 |
| 01 | 1.000007 | 1.000015 | 1.000027 | 1.000043 | 1.000062 | 1.000110 |
| 02 | 1.000007 | 1.000016 | 1.000028 | 1.000043 | 1.000062 | 1.000111 |
| 03 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000064 | 1.000113 |
| 04 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000065 | 1.000116 |
| 05 | 1.000007 | 1.000017 | 1.000030 | 1.000046 | 1.000067 | 1.000119 |
| 06 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000121 |
| 07 | 1.000008 | 1.000017 | 1.000031 | 1.000048 | 1.000069 | 1.000123 |
| 08 | 1.000008 | 1.000017 | 1.000031 | 1.000048 | 1.000069 | 1.000122 |
| 09 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000067 | 1.000120 |
| 10 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000064 | 1.000114 |
| 11 | 1.000007 | 1.000015 | 1.000026 | 1.000041 | 1.000059 | 1.000105 |
| 12 | 1.000006 | 1.000013 | 1.000023 | 1.000035 | 1.000051 | 1.000090 |
| 13 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 14 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000047 |
| 15 | 1.000001 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000017 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999991 | 0.999983 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000245 | 1.000436 | 1.000680 | 1.001525 | 1.002695 | 1.004178 |
| 01 | 1.000247 | 1.000438 | 1.000683 | 1.001532 | 1.002707 | 1.004198 |
| 02 | 1.000250 | 1.000443 | 1.000692 | 1.001552 | 1.002744 | 1.004258 |
| 03 | 1.000254 | 1.000452 | 1.000706 | 1.001583 | 1.002801 | 1.004350 |
| 04 | 1.000260 | 1.000463 | 1.000723 | 1.001622 | 1.002872 | 1.004466 |
| 05 | 1.000267 | 1.000474 | 1.000740 | 1.001663 | 1.002948 | 1.004591 |
| 06 | 1.000272 | 1.000484 | 1.000756 | 1.001699 | 1.003017 | 1.004706 |
| 07 | 1.000276 | 1.000490 | 1.000766 | 1.001723 | 1.003064 | 1.004788 |
| 08 | 1.000275 | 1.000490 | 1.000765 | 1.001724 | 1.003071 | 1.004808 |
| 09 | 1.000270 | 1.000480 | 1.000750 | 1.001692 | 1.003018 | 1.004735 |
| 10 | 1.000257 | 1.000457 | 1.000715 | 1.001615 | 1.002884 | 1.004534 |
| 11 | 1.000235 | 1.000419 | 1.000656 | 1.001482 | 1.002650 | 1.004174 |
| 12 | 1.000204 | 1.000362 | 1.000567 | 1.001283 | 1.002298 | 1.003626 |
| 13 | 1.000160 | 1.000286 | 1.000447 | 1.001012 | 1.001815 | 1.002868 |
| 14 | 1.000105 | 1.000188 | 1.000294 | 1.000666 | 1.001196 | 1.001894 |
| 15 | 1.000039 | 1.000070 | 1.000109 | 1.000248 | 1.000446 | 1.000709 |
| 16 | 0.999963 | 0.999933 | 0.999896 | 0.999765 | 0.999579 | 0.999337 |

## TABLE I-A LONG SOLENOID RATIOS

L = 0.870

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000007 | 1.000015 | 1.000027 | 1.000042 | 1.000060 | 1.000107 |
| 01 | 1.000007 | 1.000015 | 1.000027 | 1.000042 | 1.000061 | 1.000108 |
| 02 | 1.000007 | 1.000015 | 1.000027 | 1.000043 | 1.000061 | 1.000109 |
| 03 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000063 | 1.000111 |
| 04 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000064 | 1.000114 |
| 05 | 1.000007 | 1.000016 | 1.000029 | 1.000046 | 1.000066 | 1.000117 |
| 06 | 1.000007 | 1.000017 | 1.000030 | 1.000047 | 1.000067 | 1.000120 |
| 07 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000121 |
| 08 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000121 |
| 09 | 1.000007 | 1.000017 | 1.000030 | 1.000047 | 1.000067 | 1.000119 |
| 10 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000064 | 1.000114 |
| 11 | 1.000007 | 1.000015 | 1.000026 | 1.000041 | 1.000059 | 1.000104 |
| 12 | 1.000006 | 1.000013 | 1.000023 | 1.000035 | 1.000051 | 1.000090 |
| 13 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 14 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000047 |
| 15 | 1.000001 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000017 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999990 | 0.999983 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000241 | 1.000429 | 1.000669 | 1.001499 | 1.002649 | 1.004107 |
| 01 | 1.000242 | 1.000431 | 1.000672 | 1.001506 | 1.002662 | 1.004128 |
| 02 | 1.000246 | 1.000436 | 1.000681 | 1.001527 | 1.002700 | 1.004189 |
| 03 | 1.000251 | 1.000445 | 1.000695 | 1.001559 | 1.002759 | 1.004284 |
| 04 | 1.000257 | 1.000456 | 1.000713 | 1.001599 | 1.002832 | 1.004404 |
| 05 | 1.000263 | 1.000468 | 1.000731 | 1.001642 | 1.002912 | 1.004534 |
| 06 | 1.000269 | 1.000479 | 1.000748 | 1.001681 | 1.002984 | 1.004655 |
| 07 | 1.000273 | 1.000485 | 1.000759 | 1.001707 | 1.003035 | 1.004743 |
| 08 | 1.000273 | 1.000486 | 1.000760 | 1.001711 | 1.003047 | 1.004771 |
| 09 | 1.000268 | 1.000477 | 1.000746 | 1.001682 | 1.002999 | 1.004705 |
| 10 | 1.000256 | 1.000455 | 1.000712 | 1.001607 | 1.002870 | 1.004512 |
| 11 | 1.000235 | 1.000418 | 1.000653 | 1.001476 | 1.002641 | 1.004159 |
| 12 | 1.000203 | 1.000361 | 1.000566 | 1.001279 | 1.002292 | 1.003616 |
| 13 | 1.000160 | 1.000285 | 1.000446 | 1.001009 | 1.001811 | 1.002862 |
| 14 | 1.000105 | 1.000187 | 1.000293 | 1.000664 | 1.001192 | 1.001889 |
| 15 | 1.000039 | 1.000069 | 1.000108 | 1.000245 | 1.000441 | 1.000702 |
| 16 | 0.999962 | 0.999932 | 0.999894 | 0.999761 | 0.999572 | 0.999327 |

# TABLE I-A LONG SOLENOID RATIOS

L = 0.875

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000007 | 1.000015 | 1.000026 | 1.000041 | 1.000059 | 1.000106 |
| 01 | 1.000007 | 1.000015 | 1.000027 | 1.000041 | 1.000060 | 1.000106 |
| 02 | 1.000007 | 1.000015 | 1.000027 | 1.000042 | 1.000060 | 1.000108 |
| 03 | 1.000007 | 1.000015 | 1.000027 | 1.000043 | 1.000062 | 1.000110 |
| 04 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000063 | 1.000113 |
| 05 | 1.000007 | 1.000016 | 1.000029 | 1.000045 | 1.000065 | 1.000116 |
| 06 | 1.000007 | 1.000017 | 1.000030 | 1.000046 | 1.000067 | 1.000118 |
| 07 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000120 |
| 08 | 1.000008 | 1.000017 | 1.000030 | 1.000047 | 1.000068 | 1.000121 |
| 09 | 1.000007 | 1.000017 | 1.000030 | 1.000046 | 1.000067 | 1.000118 |
| 10 | 1.000007 | 1.000016 | 1.000028 | 1.000044 | 1.000064 | 1.000113 |
| 11 | 1.000006 | 1.000015 | 1.000026 | 1.000041 | 1.000058 | 1.000104 |
| 12 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000051 | 1.000090 |
| 13 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 14 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000047 |
| 15 | 1.000001 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000017 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999990 | 0.999983 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000237 | 1.000421 | 1.000658 | 1.001474 | 1.002604 | 1.004036 |
| 01 | 1.000238 | 1.000423 | 1.000661 | 1.001481 | 1.002617 | 1.004058 |
| 02 | 1.000242 | 1.000429 | 1.000670 | 1.001502 | 1.002656 | 1.004120 |
| 03 | 1.000247 | 1.000439 | 1.000685 | 1.001535 | 1.002717 | 1.004218 |
| 04 | 1.000253 | 1.000450 | 1.000703 | 1.001577 | 1.002793 | 1.004342 |
| 05 | 1.000260 | 1.000462 | 1.000722 | 1.001622 | 1.002875 | 1.004476 |
| 06 | 1.000266 | 1.000473 | 1.000740 | 1.001662 | 1.002952 | 1.004603 |
| 07 | 1.000271 | 1.000481 | 1.000752 | 1.001691 | 1.003007 | 1.004699 |
| 08 | 1.000271 | 1.000482 | 1.000754 | 1.001698 | 1.003023 | 1.004734 |
| 09 | 1.000266 | 1.000474 | 1.000741 | 1.001671 | 1.002980 | 1.004676 |
| 10 | 1.000255 | 1.000453 | 1.000708 | 1.001599 | 1.002857 | 1.004491 |
| 11 | 1.000234 | 1.000416 | 1.000651 | 1.001471 | 1.002631 | 1.004145 |
| 12 | 1.000202 | 1.000360 | 1.000564 | 1.001276 | 1.002286 | 1.003607 |
| 13 | 1.000160 | 1.000284 | 1.000445 | 1.001007 | 1.001807 | 1.002856 |
| 14 | 1.000105 | 1.000187 | 1.000292 | 1.000662 | 1.001189 | 1.001884 |
| 15 | 1.000038 | 1.000068 | 1.000107 | 1.000243 | 1.000437 | 1.000695 |
| 16 | 0.999961 | 0.999931 | 0.999892 | 0.999757 | 0.999565 | 0.999316 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.000

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000004 | 1.000009 | 1.000017 | 1.000026 | 1.000037 | 1.000067 |
| 01 | 1.000004 | 1.000009 | 1.000017 | 1.000026 | 1.000038 | 1.000067 |
| 02 | 1.000004 | 1.000010 | 1.000017 | 1.000027 | 1.000039 | 1.000070 |
| 03 | 1.000005 | 1.000010 | 1.000018 | 1.000029 | 1.000041 | 1.000073 |
| 04 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000044 | 1.000078 |
| 05 | 1.000005 | 1.000012 | 1.000021 | 1.000033 | 1.000047 | 1.000084 |
| 06 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000051 | 1.000090 |
| 07 | 1.000006 | 1.000013 | 1.000024 | 1.000037 | 1.000054 | 1.000096 |
| 08 | 1.000006 | 1.000014 | 1.000025 | 1.000039 | 1.000056 | 1.000100 |
| 09 | 1.000006 | 1.000014 | 1.000026 | 1.000040 | 1.000058 | 1.000103 |
| 10 | 1.000006 | 1.000014 | 1.000026 | 1.000040 | 1.000057 | 1.000102 |
| 11 | 1.000006 | 1.000014 | 1.000024 | 1.000038 | 1.000055 | 1.000097 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000004 | 1.000010 | 1.000017 | 1.000027 | 1.000039 | 1.000070 |
| 14 | 1.000003 | 1.000006 | 1.000011 | 1.000018 | 1.000026 | 1.000046 |
| 15 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000015 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999988 | 0.999979 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000150 | 1.000266 | 1.000415 | 1.000927 | 1.001634 | 1.002524 |
| 01 | 1.000151 | 1.000269 | 1.000420 | 1.000938 | 1.001654 | 1.002556 |
| 02 | 1.000157 | 1.000278 | 1.000434 | 1.000971 | 1.001712 | 1.002648 |
| 03 | 1.000165 | 1.000293 | 1.000457 | 1.001023 | 1.001807 | 1.002797 |
| 04 | 1.000176 | 1.000312 | 1.000488 | 1.001093 | 1.001931 | 1.002995 |
| 05 | 1.000189 | 1.000335 | 1.000523 | 1.001174 | 1.002078 | 1.003229 |
| 06 | 1.000202 | 1.000360 | 1.000561 | 1.001261 | 1.002236 | 1.003480 |
| 07 | 1.000215 | 1.000383 | 1.000598 | 1.001344 | 1.002387 | 1.003725 |
| 08 | 1.000226 | 1.000401 | 1.000627 | 1.001412 | 1.002513 | 1.003930 |
| 09 | 1.000231 | 1.000412 | 1.000644 | 1.001451 | 1.002587 | 1.004055 |
| 10 | 1.000230 | 1.000409 | 1.000640 | 1.001445 | 1.002580 | 1.004055 |
| 11 | 1.000219 | 1.000389 | 1.000609 | 1.001376 | 1.002462 | 1.003880 |
| 12 | 1.000195 | 1.000347 | 1.000543 | 1.001229 | 1.002204 | 1.003481 |
| 13 | 1.000157 | 1.000279 | 1.000438 | 1.000992 | 1.001781 | 1.002819 |
| 14 | 1.000103 | 1.000184 | 1.000289 | 1.000655 | 1.001179 | 1.001873 |
| 15 | 1.000035 | 1.000062 | 1.000097 | 1.000221 | 1.000401 | 1.000643 |
| 16 | 0.999952 | 0.999915 | 0.999867 | 0.999699 | 0.999464 | 0.999161 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.300

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000006 | 1.000011 |
| 01 | 1.000001 | 1.000002 | 1.000003 | 1.000005 | 1.000007 | 1.000012 |
| 02 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000015 |
| 03 | 1.000001 | 1.000003 | 1.000005 | 1.000008 | 1.000011 | 1.000020 |
| 04 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000015 | 1.000026 |
| 05 | 1.000002 | 1.000005 | 1.000009 | 1.000013 | 1.000019 | 1.000034 |
| 06 | 1.000003 | 1.000006 | 1.000011 | 1.000017 | 1.000025 | 1.000044 |
| 07 | 1.000003 | 1.000008 | 1.000014 | 1.000021 | 1.000031 | 1.000055 |
| 08 | 1.000004 | 1.000009 | 1.000017 | 1.000026 | 1.000037 | 1.000066 |
| 09 | 1.000005 | 1.000011 | 1.000019 | 1.000030 | 1.000043 | 1.000077 |
| 10 | 1.000005 | 1.000012 | 1.000021 | 1.000033 | 1.000048 | 1.000085 |
| 11 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000051 | 1.000090 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000019 | 1.000030 | 1.000043 | 1.000077 |
| 14 | 1.000003 | 1.000008 | 1.000014 | 1.000022 | 1.000031 | 1.000055 |
| 15 | 1.000001 | 1.000003 | 1.000006 | 1.000009 | 1.000013 | 1.000022 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999988 | 0.999979 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000026 | 1.000045 | 1.000070 | 1.000155 | 1.000267 | 1.000402 |
| 01 | 1.000028 | 1.000049 | 1.000076 | 1.000168 | 1.000290 | 1.000437 |
| 02 | 1.000034 | 1.000060 | 1.000093 | 1.000206 | 1.000358 | 1.000543 |
| 03 | 1.000044 | 1.000078 | 1.000122 | 1.000270 | 1.000472 | 1.000721 |
| 04 | 1.000058 | 1.000104 | 1.000162 | 1.000360 | 1.000632 | 1.000970 |
| 05 | 1.000077 | 1.000136 | 1.000212 | 1.000475 | 1.000835 | 1.001288 |
| 06 | 1.000099 | 1.000175 | 1.000273 | 1.000611 | 1.001079 | 1.001670 |
| 07 | 1.000123 | 1.000218 | 1.000341 | 1.000765 | 1.001354 | 1.002102 |
| 08 | 1.000149 | 1.000264 | 1.000412 | 1.000926 | 1.001643 | 1.002559 |
| 09 | 1.000173 | 1.000307 | 1.000480 | 1.001080 | 1.001920 | 1.002999 |
| 10 | 1.000192 | 1.000342 | 1.000534 | 1.001204 | 1.002146 | 1.003363 |
| 11 | 1.000202 | 1.000360 | 1.000563 | 1.001271 | 1.002270 | 1.003568 |
| 12 | 1.000198 | 1.000352 | 1.000550 | 1.001245 | 1.002229 | 1.003516 |
| 13 | 1.000173 | 1.000308 | 1.000483 | 1.001093 | 1.001963 | 1.003106 |
| 14 | 1.000125 | 1.000222 | 1.000348 | 1.000789 | 1.001420 | 1.002256 |
| 15 | 1.000050 | 1.000090 | 1.000141 | 1.000321 | 1.000582 | 1.000933 |
| 16 | 0.999953 | 0.999916 | 0.999868 | 0.999704 | 0.999473 | 0.999176 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.350

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000006 |
| 01 | 1.000000 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000007 |
| 02 | 1.000001 | 1.000001 | 1.000002 | 1.000004 | 1.000005 | 1.000009 |
| 03 | 1.000001 | 1.000002 | 1.000004 | 1.000005 | 1.000008 | 1.000014 |
| 04 | 1.000001 | 1.000003 | 1.000005 | 1.000008 | 1.000011 | 1.000020 |
| 05 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000016 | 1.000028 |
| 06 | 1.000002 | 1.000005 | 1.000010 | 1.000015 | 1.000022 | 1.000038 |
| 07 | 1.000003 | 1.000007 | 1.000012 | 1.000019 | 1.000028 | 1.000049 |
| 08 | 1.000004 | 1.000009 | 1.000015 | 1.000024 | 1.000035 | 1.000061 |
| 09 | 1.000005 | 1.000010 | 1.000018 | 1.000029 | 1.000041 | 1.000073 |
| 10 | 1.000005 | 1.000012 | 1.000021 | 1.000032 | 1.000047 | 1.000083 |
| 11 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000044 | 1.000078 |
| 14 | 1.000004 | 1.000008 | 1.000014 | 1.000022 | 1.000032 | 1.000057 |
| 15 | 1.000002 | 1.000003 | 1.000006 | 1.000009 | 1.000014 | 1.000024 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999988 | 0.999979 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000013 | 1.000023 | 1.000036 | 1.000078 | 1.000132 | 1.000193 |
| 01 | 1.000015 | 1.000027 | 1.000042 | 1.000091 | 1.000154 | 1.000227 |
| 02 | 1.000021 | 1.000038 | 1.000058 | 1.000128 | 1.000221 | 1.000330 |
| 03 | 1.000031 | 1.000056 | 1.000086 | 1.000191 | 1.000333 | 1.000504 |
| 04 | 1.000046 | 1.000081 | 1.000126 | 1.000280 | 1.000490 | 1.000750 |
| 05 | 1.000064 | 1.000113 | 1.000177 | 1.000395 | 1.000694 | 1.001068 |
| 06 | 1.000086 | 1.000153 | 1.000238 | 1.000533 | 1.000940 | 1.001453 |
| 07 | 1.000111 | 1.000198 | 1.000308 | 1.000691 | 1.001222 | 1.001896 |
| 08 | 1.000138 | 1.000245 | 1.000383 | 1.000861 | 1.001526 | 1.002375 |
| 09 | 1.000164 | 1.000292 | 1.000457 | 1.001027 | 1.001825 | 1.002850 |
| 10 | 1.000187 | 1.000332 | 1.000519 | 1.001169 | 1.002082 | 1.003261 |
| 11 | 1.000200 | 1.000356 | 1.000556 | 1.001255 | 1.002242 | 1.003523 |
| 12 | 1.000199 | 1.000353 | 1.000553 | 1.001250 | 1.002238 | 1.003528 |
| 13 | 1.000177 | 1.000314 | 1.000492 | 1.001115 | 1.002001 | 1.003165 |
| 14 | 1.000129 | 1.000230 | 1.000360 | 1.000818 | 1.001472 | 1.002337 |
| 15 | 1.000054 | 1.000097 | 1.000152 | 1.000346 | 1.000626 | 1.001001 |
| 16 | 0.999954 | 0.999918 | 0.999872 | 0.999711 | 0.999487 | 0.999198 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.380

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 |
| 01 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000002 | 1.000004 |
| 02 | 1.000000 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000007 |
| 03 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000006 | 1.000011 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000017 |
| 05 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 06 | 1.000002 | 1.000005 | 1.000009 | 1.000014 | 1.000020 | 1.000035 |
| 07 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000046 |
| 08 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 09 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000046 | 1.000081 |
| 11 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000050 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000079 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 1.000007 | 1.000012 | 1.000018 | 1.000038 | 1.000061 | 1.000082 |
| 01 | 1.000009 | 1.000015 | 1.000023 | 1.000050 | 1.000082 | 1.000115 |
| 02 | 1.000015 | 1.000026 | 1.000040 | 1.000087 | 1.000147 | 1.000217 |
| 03 | 1.000025 | 1.000043 | 1.000067 | 1.000149 | 1.000257 | 1.000388 |
| 04 | 1.000039 | 1.000068 | 1.000107 | 1.000237 | 1.000413 | 1.000630 |
| 05 | 1.000057 | 1.000101 | 1.000157 | 1.000350 | 1.000615 | 1.000946 |
| 06 | 1.000079 | 1.000140 | 1.000219 | 1.000489 | 1.000862 | 1.001332 |
| 07 | 1.000105 | 1.000186 | 1.000290 | 1.000649 | 1.001148 | 1.001779 |
| 08 | 1.000132 | 1.000235 | 1.000367 | 1.000823 | 1.001458 | 1.002269 |
| 09 | 1.000160 | 1.000284 | 1.000443 | 1.000996 | 1.001770 | 1.002762 |
| 10 | 1.000183 | 1.000326 | 1.000509 | 1.001148 | 1.002044 | 1.003200 |
| 11 | 1.000198 | 1.000353 | 1.000552 | 1.001246 | 1.002224 | 1.003494 |
| 12 | 1.000199 | 1.000354 | 1.000554 | 1.001253 | 1.002242 | 1.003534 |
| 13 | 1.000179 | 1.000318 | 1.000498 | 1.001127 | 1.002023 | 1.003199 |
| 14 | 1.000132 | 1.000235 | 1.000368 | 1.000835 | 1.001503 | 1.002386 |
| 15 | 1.000057 | 1.000101 | 1.000158 | 1.000361 | 1.000653 | 1.001044 |
| 16 | 0.999955 | 0.999919 | 0.999874 | 0.999716 | 0.999496 | 0.999212 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.383

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 |
| 01 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 | 1.000004 |
| 02 | 1.000000 | 1.000001 | 1.000002 | 1.000002 | 1.000004 | 1.000006 |
| 03 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000006 | 1.000011 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000017 |
| 05 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 06 | 1.000002 | 1.000005 | 1.000009 | 1.000014 | 1.000020 | 1.000035 |
| 07 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000046 |
| 08 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000058 |
| 09 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000046 | 1.000081 |
| 11 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000050 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000079 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000006 | 1.000011 | 1.000016 | 1.000034 | 1.000054 | 1.000071 |
| 01 | 1.000008 | 1.000014 | 1.000022 | 1.000046 | 1.000075 | 1.000104 |
| 02 | 1.000014 | 1.000025 | 1.000038 | 1.000083 | 1.000140 | 1.000206 |
| 03 | 1.000024 | 1.000042 | 1.000066 | 1.000145 | 1.000250 | 1.000376 |
| 04 | 1.000038 | 1.000067 | 1.000105 | 1.000232 | 1.000406 | 1.000619 |
| 05 | 1.000056 | 1.000100 | 1.000155 | 1.000346 | 1.000608 | 1.000934 |
| 06 | 1.000078 | 1.000139 | 1.000217 | 1.000485 | 1.000855 | 1.001320 |
| 07 | 1.000104 | 1.000185 | 1.000288 | 1.000645 | 1.001140 | 1.001768 |
| 08 | 1.000132 | 1.000234 | 1.000365 | 1.000819 | 1.001452 | 1.002258 |
| 09 | 1.000159 | 1.000283 | 1.000442 | 1.000993 | 1.001764 | 1.002753 |
| 10 | 1.000183 | 1.000325 | 1.000508 | 1.001146 | 1.002040 | 1.003193 |
| 11 | 1.000198 | 1.000353 | 1.000552 | 1.001245 | 1.002223 | 1.003491 |
| 12 | 1.000199 | 1.000354 | 1.000554 | 1.001253 | 1.002243 | 1.003535 |
| 13 | 1.000179 | 1.000318 | 1.000498 | 1.001129 | 1.002025 | 1.003203 |
| 14 | 1.000132 | 1.000235 | 1.000369 | 1.000837 | 1.001506 | 1.002391 |
| 15 | 1.000057 | 1.000101 | 1.000159 | 1.000362 | 1.000655 | 1.001048 |
| 16 | 0.999955 | 0.999919 | 0.999874 | 0.999717 | 0.999497 | 0.999213 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.385

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000003 |
| 01 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 |
| 02 | 1.000000 | 1.000001 | 1.000002 | 1.000002 | 1.000003 | 1.000006 |
| 03 | 1.000001 | 1.000001 | 1.000003 | 1.000004 | 1.000006 | 1.000010 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000007 | 1.000009 | 1.000017 |
| 05 | 1.000002 | 1.000003 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 06 | 1.000002 | 1.000005 | 1.000009 | 1.000014 | 1.000019 | 1.000035 |
| 07 | 1.000003 | 1.000006 | 1.000012 | 1.000018 | 1.000026 | 1.000046 |
| 08 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000058 |
| 09 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000046 | 1.000081 |
| 11 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000050 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000079 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000006 | 1.000010 | 1.000015 | 1.000031 | 1.000049 | 1.000064 |
| 01 | 1.000008 | 1.000013 | 1.000020 | 1.000043 | 1.000071 | 1.000097 |
| 02 | 1.000013 | 1.000024 | 1.000037 | 1.000080 | 1.000136 | 1.000199 |
| 03 | 1.000023 | 1.000041 | 1.000064 | 1.000142 | 1.000245 | 1.000369 |
| 04 | 1.000037 | 1.000066 | 1.000103 | 1.000230 | 1.000401 | 1.000611 |
| 05 | 1.000056 | 1.000099 | 1.000154 | 1.000343 | 1.000603 | 1.000926 |
| 06 | 1.000078 | 1.000138 | 1.000216 | 1.000482 | 1.000850 | 1.001312 |
| 07 | 1.000103 | 1.000184 | 1.000287 | 1.000643 | 1.001135 | 1.001760 |
| 08 | 1.000131 | 1.000233 | 1.000364 | 1.000817 | 1.001447 | 1.002251 |
| 09 | 1.000159 | 1.000282 | 1.000441 | 1.000991 | 1.001761 | 1.002748 |
| 10 | 1.000183 | 1.000325 | 1.000508 | 1.001144 | 1.002037 | 1.003189 |
| 11 | 1.000198 | 1.000353 | 1.000551 | 1.001244 | 1.002221 | 1.003489 |
| 12 | 1.000199 | 1.000354 | 1.000554 | 1.001253 | 1.002243 | 1.003535 |
| 13 | 1.000179 | 1.000319 | 1.000499 | 1.001130 | 1.002027 | 1.003205 |
| 14 | 1.000132 | 1.000236 | 1.000369 | 1.000838 | 1.001508 | 1.002394 |
| 15 | 1.000057 | 1.000102 | 1.000159 | 1.000363 | 1.000657 | 1.001051 |
| 16 | 0.999955 | 0.999920 | 0.999874 | 0.999717 | 0.999497 | 0.999214 |

## TABLE I-A LONG SOLENOID RATIOS

$L = 1.388$

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 |
| 01 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 |
| 02 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000006 |
| 03 | 1.000001 | 1.000001 | 1.000003 | 1.000004 | 1.000006 | 1.000010 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000016 |
| 05 | 1.000002 | 1.000003 | 1.000006 | 1.000010 | 1.000014 | 1.000024 |
| 06 | 1.000002 | 1.000005 | 1.000009 | 1.000013 | 1.000019 | 1.000034 |
| 07 | 1.000003 | 1.000006 | 1.000011 | 1.000018 | 1.000026 | 1.000046 |
| 08 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000058 |
| 09 | 1.000004 | 1.000010 | 1.000018 | 1.000027 | 1.000040 | 1.000070 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000046 | 1.000081 |
| 11 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000080 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000005 | 1.000009 | 1.000013 | 1.000028 | 1.000042 | 1.000054 |
| 01 | 1.000007 | 1.000012 | 1.000019 | 1.000040 | 1.000064 | 1.000087 |
| 02 | 1.000013 | 1.000023 | 1.000035 | 1.000076 | 1.000129 | 1.000188 |
| 03 | 1.000023 | 1.000040 | 1.000063 | 1.000138 | 1.000238 | 1.000358 |
| 04 | 1.000037 | 1.000065 | 1.000102 | 1.000226 | 1.000393 | 1.000600 |
| 05 | 1.000055 | 1.000098 | 1.000152 | 1.000339 | 1.000595 | 1.000914 |
| 06 | 1.000077 | 1.000137 | 1.000214 | 1.000478 | 1.000842 | 1.001300 |
| 07 | 1.000103 | 1.000183 | 1.000285 | 1.000638 | 1.001128 | 1.001749 |
| 08 | 1.000131 | 1.000232 | 1.000362 | 1.000813 | 1.001441 | 1.002241 |
| 09 | 1.000158 | 1.000281 | 1.000439 | 1.000988 | 1.001755 | 1.002739 |
| 10 | 1.000182 | 1.000324 | 1.000507 | 1.001142 | 1.002033 | 1.003183 |
| 11 | 1.000198 | 1.000352 | 1.000551 | 1.001243 | 1.002220 | 1.003486 |
| 12 | 1.000199 | 1.000354 | 1.000554 | 1.001254 | 1.002244 | 1.003536 |
| 13 | 1.000179 | 1.000319 | 1.000499 | 1.001131 | 1.002029 | 1.003209 |
| 14 | 1.000133 | 1.000236 | 1.000370 | 1.000840 | 1.001511 | 1.002399 |
| 15 | 1.000057 | 1.000102 | 1.000160 | 1.000365 | 1.000660 | 1.001055 |
| 16 | 0.999955 | 0.999920 | 0.999875 | 0.999718 | 0.999498 | 0.999216 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.390

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 |
| 01 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 |
| 02 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000006 |
| 03 | 1.000001 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000010 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000016 |
| 05 | 1.000002 | 1.000003 | 1.000006 | 1.000009 | 1.000014 | 1.000024 |
| 06 | 1.000002 | 1.000005 | 1.000009 | 1.000013 | 1.000019 | 1.000034 |
| 07 | 1.000003 | 1.000006 | 1.000011 | 1.000018 | 1.000026 | 1.000046 |
| 08 | 1.000004 | 1.000008 | 1.000014 | 1.000023 | 1.000033 | 1.000058 |
| 09 | 1.000004 | 1.000010 | 1.000018 | 1.000027 | 1.000039 | 1.000070 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000046 | 1.000081 |
| 11 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000080 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000005 | 1.000008 | 1.000012 | 1.000025 | 1.000038 | 1.000047 |
| 01 | 1.000007 | 1.000012 | 1.000018 | 1.000037 | 1.000059 | 1.000080 |
| 02 | 1.000012 | 1.000022 | 1.000034 | 1.000074 | 1.000124 | 1.000181 |
| 03 | 1.000022 | 1.000040 | 1.000061 | 1.000135 | 1.000234 | 1.000351 |
| 04 | 1.000036 | 1.000064 | 1.000100 | 1.000223 | 1.000389 | 1.000592 |
| 05 | 1.000055 | 1.000097 | 1.000151 | 1.000336 | 1.000590 | 1.000907 |
| 06 | 1.000077 | 1.000136 | 1.000213 | 1.000475 | 1.000837 | 1.001293 |
| 07 | 1.000102 | 1.000182 | 1.000284 | 1.000636 | 1.001123 | 1.001742 |
| 08 | 1.000130 | 1.000231 | 1.000361 | 1.000811 | 1.001436 | 1.002234 |
| 09 | 1.000158 | 1.000281 | 1.000439 | 1.000986 | 1.001752 | 1.002733 |
| 10 | 1.000182 | 1.000324 | 1.000506 | 1.001141 | 1.002031 | 1.003179 |
| 11 | 1.000198 | 1.000352 | 1.000551 | 1.001243 | 1.002218 | 1.003484 |
| 12 | 1.000199 | 1.000354 | 1.000555 | 1.001254 | 1.002244 | 1.003536 |
| 13 | 1.000179 | 1.000319 | 1.000500 | 1.001132 | 1.002031 | 1.003211 |
| 14 | 1.000133 | 1.000237 | 1.000371 | 1.000841 | 1.001513 | 1.002402 |
| 15 | 1.000057 | 1.000102 | 1.000160 | 1.000366 | 1.000662 | 1.001058 |
| 16 | 0.999955 | 0.999920 | 0.999875 | 0.999718 | 0.999499 | 0.999217 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.393

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 |
| 01 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 |
| 02 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000005 |
| 03 | 1.000001 | 1.000001 | 1.000002 | 1.000004 | 1.000005 | 1.000010 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000016 |
| 05 | 1.000002 | 1.000003 | 1.000006 | 1.000009 | 1.000014 | 1.000024 |
| 06 | 1.000002 | 1.000005 | 1.000008 | 1.000013 | 1.000019 | 1.000034 |
| 07 | 1.000003 | 1.000006 | 1.000011 | 1.000018 | 1.000025 | 1.000045 |
| 08 | 1.000004 | 1.000008 | 1.000014 | 1.000023 | 1.000032 | 1.000058 |
| 09 | 1.000004 | 1.000010 | 1.000018 | 1.000027 | 1.000039 | 1.000070 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000045 | 1.000081 |
| 11 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000080 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000026 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000004 | 1.000007 | 1.000011 | 1.000021 | 1.000031 | 1.000036 |
| 01 | 1.000006 | 1.000010 | 1.000016 | 1.000033 | 1.000053 | 1.000070 |
| 02 | 1.000012 | 1.000021 | 1.000032 | 1.000070 | 1.000117 | 1.000170 |
| 03 | 1.000022 | 1.000038 | 1.000060 | 1.000131 | 1.000227 | 1.000340 |
| 04 | 1.000036 | 1.000063 | 1.000099 | 1.000219 | 1.000381 | 1.000581 |
| 05 | 1.000054 | 1.000096 | 1.000149 | 1.000332 | 1.000583 | 1.000895 |
| 06 | 1.000076 | 1.000135 | 1.000211 | 1.000471 | 1.000830 | 1.001281 |
| 07 | 1.000102 | 1.000181 | 1.000282 | 1.000632 | 1.001116 | 1.001730 |
| 08 | 1.000130 | 1.000230 | 1.000360 | 1.000807 | 1.001430 | 1.002224 |
| 09 | 1.000157 | 1.000280 | 1.000437 | 1.000983 | 1.001746 | 1.002725 |
| 10 | 1.000182 | 1.000323 | 1.000505 | 1.001138 | 1.002027 | 1.003173 |
| 11 | 1.000198 | 1.000352 | 1.000550 | 1.001242 | 1.002217 | 1.003481 |
| 12 | 1.000199 | 1.000355 | 1.000555 | 1.001254 | 1.002244 | 1.003537 |
| 13 | 1.000179 | 1.000320 | 1.000500 | 1.001133 | 1.002033 | 1.003214 |
| 14 | 1.000133 | 1.000237 | 1.000371 | 1.000843 | 1.001517 | 1.002407 |
| 15 | 1.000058 | 1.000103 | 1.000161 | 1.000367 | 1.000664 | 1.001062 |
| 16 | 0.999955 | 0.999920 | 0.999875 | 0.999719 | 0.999500 | 0.999218 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.395

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 |
| 01 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 |
| 02 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000005 |
| 03 | 1.000001 | 1.000001 | 1.000002 | 1.000004 | 1.000005 | 1.000009 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000016 |
| 05 | 1.000001 | 1.000003 | 1.000006 | 1.000009 | 1.000013 | 1.000024 |
| 06 | 1.000002 | 1.000005 | 1.000008 | 1.000013 | 1.000019 | 1.000034 |
| 07 | 1.000003 | 1.000006 | 1.000011 | 1.000018 | 1.000025 | 1.000045 |
| 08 | 1.000004 | 1.000008 | 1.000014 | 1.000022 | 1.000032 | 1.000057 |
| 09 | 1.000004 | 1.000010 | 1.000017 | 1.000027 | 1.000039 | 1.000070 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000045 | 1.000081 |
| 11 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000080 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000026 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000004 | 1.000006 | 1.000009 | 1.000019 | 1.000027 | 1.000030 |
| 01 | 1.000006 | 1.000010 | 1.000015 | 1.000031 | 1.000048 | 1.000063 |
| 02 | 1.000011 | 1.000020 | 1.000031 | 1.000067 | 1.000113 | 1.000163 |
| 03 | 1.000021 | 1.000038 | 1.000058 | 1.000129 | 1.000222 | 1.000333 |
| 04 | 1.000035 | 1.000063 | 1.000097 | 1.000216 | 1.000377 | 1.000574 |
| 05 | 1.000053 | 1.000095 | 1.000148 | 1.000329 | 1.000578 | 1.000888 |
| 06 | 1.000076 | 1.000134 | 1.000209 | 1.000468 | 1.000825 | 1.001273 |
| 07 | 1.000101 | 1.000180 | 1.000281 | 1.000629 | 1.001111 | 1.001723 |
| 08 | 1.000129 | 1.000230 | 1.000358 | 1.000805 | 1.001425 | 1.002217 |
| 09 | 1.000157 | 1.000279 | 1.000436 | 1.000981 | 1.001743 | 1.002719 |
| 10 | 1.000182 | 1.000323 | 1.000505 | 1.001137 | 1.002024 | 1.003169 |
| 11 | 1.000198 | 1.000352 | 1.000550 | 1.001241 | 1.002215 | 1.003479 |
| 12 | 1.000199 | 1.000355 | 1.000555 | 1.001254 | 1.002244 | 1.003537 |
| 13 | 1.000180 | 1.000320 | 1.000501 | 1.001134 | 1.002034 | 1.003217 |
| 14 | 1.000133 | 1.000237 | 1.000372 | 1.000844 | 1.001519 | 1.002410 |
| 15 | 1.000058 | 1.000103 | 1.000162 | 1.000368 | 1.000666 | 1.001065 |
| 16 | 0.999955 | 0.999920 | 0.999875 | 0.999719 | 0.999500 | 0.999219 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.398

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 1.000000 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000001 |
| 01 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 |
| 02 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000005 |
| 03 | 1.000001 | 1.000001 | 1.000002 | 1.000004 | 1.000005 | 1.000009 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000015 |
| 05 | 1.000001 | 1.000003 | 1.000006 | 1.000009 | 1.000013 | 1.000023 |
| 06 | 1.000002 | 1.000005 | 1.000008 | 1.000013 | 1.000019 | 1.000033 |
| 07 | 1.000003 | 1.000006 | 1.000011 | 1.000017 | 1.000025 | 1.000045 |
| 08 | 1.000004 | 1.000008 | 1.000014 | 1.000022 | 1.000032 | 1.000057 |
| 09 | 1.000004 | 1.000010 | 1.000017 | 1.000027 | 1.000039 | 1.000070 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000081 |
| 11 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000080 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000026 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 1.000003 | 1.000005 | 1.000008 | 1.000015 | 1.000020 | 1.000020 |
| 01 | 1.000005 | 1.000009 | 1.000013 | 1.000027 | 1.000042 | 1.000053 |
| 02 | 1.000011 | 1.000019 | 1.000029 | 1.000063 | 1.000106 | 1.000153 |
| 03 | 1.000021 | 1.000037 | 1.000057 | 1.000125 | 1.000215 | 1.000322 |
| 04 | 1.000035 | 1.000061 | 1.000096 | 1.000212 | 1.000369 | 1.000562 |
| 05 | 1.000053 | 1.000094 | 1.000146 | 1.000325 | 1.000571 | 1.000876 |
| 06 | 1.000075 | 1.000133 | 1.000208 | 1.000464 | 1.000817 | 1.001262 |
| 07 | 1.000101 | 1.000179 | 1.000279 | 1.000625 | 1.001104 | 1.001712 |
| 08 | 1.000129 | 1.000229 | 1.000357 | 1.000801 | 1.001419 | 1.002207 |
| 09 | 1.000157 | 1.000278 | 1.000435 | 1.000978 | 1.001737 | 1.002710 |
| 10 | 1.000181 | 1.000322 | 1.000504 | 1.001135 | 1.002021 | 1.003163 |
| 11 | 1.000198 | 1.000351 | 1.000550 | 1.001240 | 1.002214 | 1.003476 |
| 12 | 1.000199 | 1.000355 | 1.000555 | 1.001254 | 1.002245 | 1.003537 |
| 13 | 1.000180 | 1.000320 | 1.000501 | 1.001135 | 1.002036 | 1.003220 |
| 14 | 1.000134 | 1.000238 | 1.000373 | 1.000846 | 1.001522 | 1.002415 |
| 15 | 1.000058 | 1.000103 | 1.000162 | 1.000370 | 1.000669 | 1.001069 |
| 16 | 0.999955 | 0.999920 | 0.999875 | 0.999719 | 0.999501 | 0.999221 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.400

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000001 | 1.000001 |
| 01 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 |
| 02 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000005 |
| 03 | 1.000001 | 1.000001 | 1.000002 | 1.000004 | 1.000005 | 1.000009 |
| 04 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000015 |
| 05 | 1.000001 | 1.000003 | 1.000006 | 1.000009 | 1.000013 | 1.000023 |
| 06 | 1.000002 | 1.000005 | 1.000008 | 1.000013 | 1.000019 | 1.000033 |
| 07 | 1.000003 | 1.000006 | 1.000011 | 1.000017 | 1.000025 | 1.000045 |
| 08 | 1.000004 | 1.000008 | 1.000014 | 1.000022 | 1.000032 | 1.000057 |
| 09 | 1.000004 | 1.000010 | 1.000017 | 1.000027 | 1.000039 | 1.000069 |
| 10 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000080 |
| 11 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000080 |
| 14 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 15 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000015 | 1.000026 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 1.000003 | 1.000005 | 1.000007 | 1.000013 | 1.000016 | 1.000013 |
| 01 | 1.000005 | 1.000008 | 1.000012 | 1.000025 | 1.000037 | 1.000046 |
| 02 | 1.000010 | 1.000018 | 1.000028 | 1.000061 | 1.000102 | 1.000146 |
| 03 | 1.000020 | 1.000036 | 1.000056 | 1.000122 | 1.000210 | 1.000315 |
| 04 | 1.000034 | 1.000061 | 1.000094 | 1.000209 | 1.000365 | 1.000555 |
| 05 | 1.000052 | 1.000093 | 1.000145 | 1.000323 | 1.000566 | 1.000869 |
| 06 | 1.000075 | 1.000132 | 1.000206 | 1.000461 | 1.000813 | 1.001254 |
| 07 | 1.000100 | 1.000178 | 1.000278 | 1.000622 | 1.001100 | 1.001704 |
| 08 | 1.000128 | 1.000228 | 1.000356 | 1.000798 | 1.001414 | 1.002200 |
| 09 | 1.000156 | 1.000278 | 1.000434 | 1.000976 | 1.001733 | 1.002705 |
| 10 | 1.000181 | 1.000322 | 1.000503 | 1.001133 | 1.002018 | 1.003159 |
| 11 | 1.000197 | 1.000351 | 1.000549 | 1.001239 | 1.002212 | 1.003474 |
| 12 | 1.000199 | 1.000355 | 1.000555 | 1.001254 | 1.002245 | 1.003538 |
| 13 | 1.000180 | 1.000320 | 1.000502 | 1.001136 | 1.002038 | 1.003222 |
| 14 | 1.000134 | 1.000238 | 1.000373 | 1.000847 | 1.001524 | 1.002418 |
| 15 | 1.000058 | 1.000104 | 1.000163 | 1.000371 | 1.000671 | 1.001072 |
| 16 | 0.999955 | 0.999920 | 0.999875 | 0.999720 | 0.999502 | 0.999222 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.500

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 0.999999 | 0.999998 | 0.999998 | 0.999996 | 0.999994 |
| 01 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999994 |
| 02 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 03 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000001 | 1.000001 |
| 04 | 1.000000 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000007 |
| 05 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000014 |
| 06 | 1.000002 | 1.000003 | 1.000006 | 1.000009 | 1.000014 | 1.000024 |
| 07 | 1.000002 | 1.000005 | 1.000009 | 1.000014 | 1.000020 | 1.000036 |
| 08 | 1.000003 | 1.000007 | 1.000012 | 1.000019 | 1.000027 | 1.000049 |
| 09 | 1.000004 | 1.000009 | 1.000016 | 1.000024 | 1.000035 | 1.000063 |
| 10 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 11 | 1.000005 | 1.000012 | 1.000021 | 1.000033 | 1.000048 | 1.000085 |
| 12 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 13 | 1.000005 | 1.000012 | 1.000021 | 1.000032 | 1.000047 | 1.000083 |
| 14 | 1.000004 | 1.000009 | 1.000016 | 1.000025 | 1.000036 | 1.000063 |
| 15 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000017 | 1.000029 |
| 16 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999981 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999986 | 0.999974 | 0.999960 | 0.999908 | 0.999831 | 0.999727 |
| 01 | 0.999987 | 0.999978 | 0.999965 | 0.999919 | 0.999851 | 0.999757 |
| 02 | 0.999993 | 0.999987 | 0.999980 | 0.999952 | 0.999910 | 0.999848 |
| 03 | 1.000002 | 1.000003 | 1.000005 | 1.000009 | 1.000010 | 1.000004 |
| 04 | 1.000015 | 1.000027 | 1.000041 | 1.000091 | 1.000155 | 1.000229 |
| 05 | 1.000033 | 1.000058 | 1.000090 | 1.000199 | 1.000347 | 1.000529 |
| 06 | 1.000054 | 1.000096 | 1.000150 | 1.000335 | 1.000589 | 1.000905 |
| 07 | 1.000080 | 1.000143 | 1.000223 | 1.000498 | 1.000878 | 1.001358 |
| 08 | 1.000110 | 1.000195 | 1.000304 | 1.000682 | 1.001207 | 1.001874 |
| 09 | 1.000141 | 1.000250 | 1.000391 | 1.000877 | 1.001557 | 1.002425 |
| 10 | 1.000170 | 1.000302 | 1.000472 | 1.001062 | 1.001889 | 1.002954 |
| 11 | 1.000192 | 1.000342 | 1.000534 | 1.001204 | 1.002148 | 1.003369 |
| 12 | 1.000200 | 1.000356 | 1.000557 | 1.001259 | 1.002252 | 1.003545 |
| 13 | 1.000186 | 1.000332 | 1.000519 | 1.001175 | 1.002107 | 1.003329 |
| 14 | 1.000143 | 1.000255 | 1.000399 | 1.000904 | 1.001626 | 1.002579 |
| 15 | 1.000066 | 1.000118 | 1.000185 | 1.000421 | 1.000761 | 1.001215 |
| 16 | 0.999958 | 0.999925 | 0.999883 | 0.999738 | 0.999533 | 0.999271 |

# TABLE I-A LONG SOLENOID RATIOS

L = 1.700

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999991 | 0.999984 |
| 01 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |
| 02 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |
| 03 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999990 |
| 04 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 05 | 1.000000 | 1.000000 | 1.000000 | 1.000001 | 1.000001 | 1.000002 |
| 06 | 1.000001 | 1.000001 | 1.000003 | 1.000004 | 1.000006 | 1.000010 |
| 07 | 1.000001 | 1.000003 | 1.000005 | 1.000008 | 1.000012 | 1.000021 |
| 08 | 1.000002 | 1.000005 | 1.000009 | 1.000013 | 1.000019 | 1.000035 |
| 09 | 1.000003 | 1.000007 | 1.000012 | 1.000019 | 1.000028 | 1.000050 |
| 10 | 1.000004 | 1.000009 | 1.000016 | 1.000026 | 1.000037 | 1.000065 |
| 11 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000079 |
| 12 | 1.000006 | 1.000012 | 1.000022 | 1.000035 | 1.000050 | 1.000088 |
| 13 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 14 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 15 | 1.000002 | 1.000005 | 1.000009 | 1.000014 | 1.000021 | 1.000036 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999991 | 0.999984 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999965 | 0.999937 | 0.999902 | 0.999777 | 0.999602 | 0.999372 |
| 01 | 0.999966 | 0.999940 | 0.999905 | 0.999786 | 0.999617 | 0.999396 |
| 02 | 0.999970 | 0.999947 | 0.999917 | 0.999812 | 0.999663 | 0.999468 |
| 03 | 0.999978 | 0.999960 | 0.999938 | 0.999858 | 0.999744 | 0.999593 |
| 04 | 0.999989 | 0.999980 | 0.999968 | 0.999926 | 0.999864 | 0.999778 |
| 05 | 1.000003 | 1.000006 | 1.000009 | 1.000019 | 1.000028 | 1.000034 |
| 06 | 1.000023 | 1.000041 | 1.000064 | 1.000141 | 1.000244 | 1.000370 |
| 07 | 1.000048 | 1.000085 | 1.000132 | 1.000295 | 1.000517 | 1.000795 |
| 08 | 1.000078 | 1.000138 | 1.000215 | 1.000481 | 1.000848 | 1.001312 |
| 09 | 1.000111 | 1.000198 | 1.000309 | 1.000694 | 1.001228 | 1.001907 |
| 10 | 1.000147 | 1.000261 | 1.000408 | 1.000917 | 1.001628 | 1.002538 |
| 11 | 1.000179 | 1.000318 | 1.000497 | 1.001120 | 1.001993 | 1.003119 |
| 12 | 1.000199 | 1.000354 | 1.000554 | 1.001250 | 1.002231 | 1.003506 |
| 13 | 1.000197 | 1.000350 | 1.000547 | 1.001238 | 1.002217 | 1.003498 |
| 14 | 1.000160 | 1.000285 | 1.000446 | 1.001012 | 1.001818 | 1.002879 |
| 15 | 1.000082 | 1.000146 | 1.000230 | 1.000522 | 1.000941 | 1.001498 |
| 16 | 0.999964 | 0.999935 | 0.999899 | 0.999773 | 0.999596 | 0.999369 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.816

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999989 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 02 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999991 | 0.999983 |
| 03 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 | 0.999986 |
| 04 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999990 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000002 | 1.000004 |
| 07 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000015 |
| 08 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000015 | 1.000027 |
| 09 | 1.000003 | 1.000006 | 1.000011 | 1.000017 | 1.000024 | 1.000043 |
| 10 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 11 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000040 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999958 | 0.999925 | 0.999883 | 0.999735 | 0.999527 | 0.999257 |
| 01 | 0.999959 | 0.999927 | 0.999886 | 0.999742 | 0.999540 | 0.999277 |
| 02 | 0.999963 | 0.999933 | 0.999896 | 0.999765 | 0.999579 | 0.999338 |
| 03 | 0.999969 | 0.999945 | 0.999913 | 0.999804 | 0.999648 | 0.999445 |
| 04 | 0.999978 | 0.999961 | 0.999940 | 0.999863 | 0.999752 | 0.999606 |
| 05 | 0.999992 | 0.999985 | 0.999976 | 0.999945 | 0.999898 | 0.999833 |
| 06 | 1.000010 | 1.000017 | 1.000026 | 1.000056 | 1.000095 | 1.000138 |
| 07 | 1.000033 | 1.000058 | 1.000090 | 1.000201 | 1.000350 | 1.000535 |
| 08 | 1.000062 | 1.000109 | 1.000170 | 1.000381 | 1.000671 | 1.001035 |
| 09 | 1.000096 | 1.000170 | 1.000266 | 1.000595 | 1.001053 | 1.001632 |
| 10 | 1.000134 | 1.000237 | 1.000371 | 1.000832 | 1.001476 | 1.002298 |
| 11 | 1.000170 | 1.000302 | 1.000472 | 1.001062 | 1.001889 | 1.002953 |
| 12 | 1.000196 | 1.000349 | 1.000546 | 1.001232 | 1.002198 | 1.003449 |
| 13 | 1.000201 | 1.000357 | 1.000559 | 1.001264 | 1.002262 | 1.003564 |
| 14 | 1.000169 | 1.000301 | 1.000471 | 1.001068 | 1.001917 | 1.003034 |
| 15 | 1.000091 | 1.000162 | 1.000254 | 1.000578 | 1.001041 | 1.001655 |
| 16 | 0.999967 | 0.999941 | 0.999907 | 0.999792 | 0.999630 | 0.999422 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.818

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999989 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 02 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999991 | 0.999983 |
| 03 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 | 0.999986 |
| 04 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999990 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000002 | 1.000004 |
| 07 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000014 |
| 08 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000015 | 1.000027 |
| 09 | 1.000003 | 1.000006 | 1.000011 | 1.000017 | 1.000024 | 1.000043 |
| 10 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 11 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000040 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999958 | 0.999925 | 0.999882 | 0.999735 | 0.999526 | 0.999256 |
| 01 | 0.999959 | 0.999927 | 0.999886 | 0.999742 | 0.999539 | 0.999275 |
| 02 | 0.999962 | 0.999933 | 0.999896 | 0.999764 | 0.999578 | 0.999336 |
| 03 | 0.999969 | 0.999944 | 0.999913 | 0.999803 | 0.999647 | 0.999443 |
| 04 | 0.999978 | 0.999961 | 0.999939 | 0.999862 | 0.999751 | 0.999604 |
| 05 | 0.999991 | 0.999985 | 0.999976 | 0.999944 | 0.999896 | 0.999830 |
| 06 | 1.000009 | 1.000016 | 1.000025 | 1.000055 | 1.000093 | 1.000134 |
| 07 | 1.000032 | 1.000058 | 1.000090 | 1.000199 | 1.000348 | 1.000531 |
| 08 | 1.000061 | 1.000109 | 1.000170 | 1.000379 | 1.000668 | 1.001030 |
| 09 | 1.000096 | 1.000170 | 1.000265 | 1.000594 | 1.001050 | 1.001628 |
| 10 | 1.000133 | 1.000237 | 1.000370 | 1.000831 | 1.001473 | 1.002294 |
| 11 | 1.000170 | 1.000302 | 1.000471 | 1.001061 | 1.001887 | 1.002950 |
| 12 | 1.000196 | 1.000349 | 1.000546 | 1.001232 | 1.002197 | 1.003448 |
| 13 | 1.000201 | 1.000357 | 1.000559 | 1.001264 | 1.002262 | 1.003565 |
| 14 | 1.000169 | 1.000301 | 1.000472 | 1.001069 | 1.001919 | 1.003037 |
| 15 | 1.000091 | 1.000163 | 1.000255 | 1.000578 | 1.001042 | 1.001658 |
| 16 | 0.999967 | 0.999941 | 0.999908 | 0.999792 | 0.999630 | 0.999423 |

TABLE I-A LONG SOLENOID RATIOS

L = 1.820

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999989 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 02 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999991 | 0.999983 |
| 03 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 | 0.999986 |
| 04 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999990 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000002 | 1.000004 |
| 07 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000014 |
| 08 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000015 | 1.000027 |
| 09 | 1.000003 | 1.000006 | 1.000011 | 1.000017 | 1.000024 | 1.000042 |
| 10 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 11 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000041 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 0.999958 | 0.999925 | 0.999882 | 0.999734 | 0.999525 | 0.999254 |
| 01 | 0.999959 | 0.999927 | 0.999885 | 0.999741 | 0.999538 | 0.999274 |
| 02 | 0.999962 | 0.999933 | 0.999895 | 0.999763 | 0.999577 | 0.999334 |
| 03 | 0.999969 | 0.999944 | 0.999913 | 0.999802 | 0.999646 | 0.999441 |
| 04 | 0.999978 | 0.999961 | 0.999939 | 0.999861 | 0.999749 | 0.999601 |
| 05 | 0.999991 | 0.999984 | 0.999975 | 0.999943 | 0.999895 | 0.999827 |
| 06 | 1.000009 | 1.000016 | 1.000025 | 1.000054 | 1.000090 | 1.000131 |
| 07 | 1.000032 | 1.000057 | 1.000089 | 1.000198 | 1.000345 | 1.000527 |
| 08 | 1.000061 | 1.000108 | 1.000169 | 1.000378 | 1.000665 | 1.001026 |
| 09 | 1.000095 | 1.000169 | 1.000264 | 1.000592 | 1.001047 | 1.001623 |
| 10 | 1.000133 | 1.000236 | 1.000369 | 1.000829 | 1.001471 | 1.002290 |
| 11 | 1.000170 | 1.000301 | 1.000471 | 1.001060 | 1.001885 | 1.002947 |
| 12 | 1.000196 | 1.000349 | 1.000546 | 1.001231 | 1.002196 | 1.003447 |
| 13 | 1.000201 | 1.000357 | 1.000559 | 1.001264 | 1.002263 | 1.003566 |
| 14 | 1.000169 | 1.000302 | 1.000472 | 1.001070 | 1.001920 | 1.003039 |
| 15 | 1.000091 | 1.000163 | 1.000255 | 1.000579 | 1.001044 | 1.001661 |
| 16 | 0.999967 | 0.999941 | 0.999908 | 0.999792 | 0.999631 | 0.999423 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.822

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999989 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 02 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999991 | 0.999983 |
| 03 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 | 0.999986 |
| 04 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999990 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000002 | 1.000004 |
| 07 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000014 |
| 08 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000015 | 1.000027 |
| 09 | 1.000003 | 1.000006 | 1.000011 | 1.000017 | 1.000024 | 1.000042 |
| 10 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 11 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000041 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999958 | 0.999924 | 0.999882 | 0.999733 | 0.999524 | 0.999253 |
| 01 | 0.999959 | 0.999927 | 0.999885 | 0.999741 | 0.999537 | 0.999272 |
| 02 | 0.999962 | 0.999933 | 0.999895 | 0.999763 | 0.999576 | 0.999333 |
| 03 | 0.999969 | 0.999944 | 0.999912 | 0.999802 | 0.999644 | 0.999439 |
| 04 | 0.999978 | 0.999961 | 0.999938 | 0.999860 | 0.999748 | 0.999599 |
| 05 | 0.999991 | 0.999984 | 0.999975 | 0.999942 | 0.999893 | 0.999824 |
| 06 | 1.000009 | 1.000016 | 1.000024 | 1.000052 | 1.000088 | 1.000127 |
| 07 | 1.000032 | 1.000057 | 1.000088 | 1.000196 | 1.000343 | 1.000523 |
| 08 | 1.000061 | 1.000108 | 1.000168 | 1.000376 | 1.000662 | 1.001021 |
| 09 | 1.000095 | 1.000169 | 1.000264 | 1.000591 | 1.001044 | 1.001619 |
| 10 | 1.000133 | 1.000236 | 1.000369 | 1.000828 | 1.001468 | 1.002285 |
| 11 | 1.000169 | 1.000301 | 1.000471 | 1.001059 | 1.001883 | 1.002944 |
| 12 | 1.000196 | 1.000349 | 1.000546 | 1.001231 | 1.002196 | 1.003446 |
| 13 | 1.000201 | 1.000358 | 1.000559 | 1.001265 | 1.002263 | 1.003567 |
| 14 | 1.000169 | 1.000302 | 1.000473 | 1.001071 | 1.001922 | 1.003042 |
| 15 | 1.000092 | 1.000163 | 1.000255 | 1.000580 | 1.001046 | 1.001663 |
| 16 | 0.999967 | 0.999941 | 0.999908 | 0.999793 | 0.999631 | 0.999424 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.824

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999989 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 02 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999991 | 0.999983 |
| 03 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999992 | 0.999986 |
| 04 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999990 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000002 | 1.000004 |
| 07 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000014 |
| 08 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000015 | 1.000027 |
| 09 | 1.000003 | 1.000006 | 1.000011 | 1.000016 | 1.000024 | 1.000042 |
| 10 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 11 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000041 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999957 | 0.999924 | 0.999882 | 0.999733 | 0.999523 | 0.999251 |
| 01 | 0.999959 | 0.999926 | 0.999885 | 0.999740 | 0.999536 | 0.999271 |
| 02 | 0.999962 | 0.999933 | 0.999895 | 0.999762 | 0.999575 | 0.999331 |
| 03 | 0.999968 | 0.999944 | 0.999912 | 0.999801 | 0.999643 | 0.999437 |
| 04 | 0.999978 | 0.999960 | 0.999938 | 0.999859 | 0.999746 | 0.999596 |
| 05 | 0.999991 | 0.999984 | 0.999974 | 0.999941 | 0.999891 | 0.999821 |
| 06 | 1.000009 | 1.000015 | 1.000024 | 1.000051 | 1.000086 | 1.000124 |
| 07 | 1.000032 | 1.000056 | 1.000088 | 1.000195 | 1.000340 | 1.000519 |
| 08 | 1.000061 | 1.000107 | 1.000168 | 1.000374 | 1.000659 | 1.001017 |
| 09 | 1.000095 | 1.000168 | 1.000263 | 1.000589 | 1.001041 | 1.001614 |
| 10 | 1.000133 | 1.000236 | 1.000368 | 1.000826 | 1.001465 | 1.002281 |
| 11 | 1.000169 | 1.000301 | 1.000470 | 1.001058 | 1.001882 | 1.002941 |
| 12 | 1.000196 | 1.000349 | 1.000545 | 1.001230 | 1.002195 | 1.003445 |
| 13 | 1.000201 | 1.000358 | 1.000560 | 1.001265 | 1.002264 | 1.003568 |
| 14 | 1.000170 | 1.000302 | 1.000473 | 1.001071 | 1.001924 | 1.003044 |
| 15 | 1.000092 | 1.000163 | 1.000256 | 1.000581 | 1.001047 | 1.001666 |
| 16 | 0.999967 | 0.999941 | 0.999908 | 0.999793 | 0.999632 | 0.999425 |

# TABLE I-A LONG SOLENOID RATIOS

L = 1.826

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999989 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 02 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999991 | 0.999983 |
| 03 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999992 | 0.999986 |
| 04 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999990 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 | 1.000004 |
| 07 | 1.000001 | 1.000002 | 1.000004 | 1.000005 | 1.000008 | 1.000014 |
| 08 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000015 | 1.000027 |
| 09 | 1.000003 | 1.000006 | 1.000011 | 1.000016 | 1.000024 | 1.000042 |
| 10 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 11 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000041 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999957 | 0.999924 | 0.999881 | 0.999732 | 0.999522 | 0.999250 |
| 01 | 0.999959 | 0.999926 | 0.999885 | 0.999739 | 0.999535 | 0.999269 |
| 02 | 0.999962 | 0.999932 | 0.999894 | 0.999761 | 0.999574 | 0.999329 |
| 03 | 0.999968 | 0.999944 | 0.999912 | 0.999800 | 0.999642 | 0.999435 |
| 04 | 0.999978 | 0.999960 | 0.999938 | 0.999858 | 0.999744 | 0.999594 |
| 05 | 0.999991 | 0.999983 | 0.999974 | 0.999940 | 0.999889 | 0.999818 |
| 06 | 1.000008 | 1.000015 | 1.000023 | 1.000050 | 1.000083 | 1.000120 |
| 07 | 1.000031 | 1.000056 | 1.000087 | 1.000193 | 1.000337 | 1.000515 |
| 08 | 1.000060 | 1.000107 | 1.000167 | 1.000373 | 1.000656 | 1.001012 |
| 09 | 1.000095 | 1.000168 | 1.000262 | 1.000587 | 1.001038 | 1.001609 |
| 10 | 1.000132 | 1.000235 | 1.000367 | 1.000825 | 1.001463 | 1.002277 |
| 11 | 1.000169 | 1.000301 | 1.000470 | 1.001057 | 1.001880 | 1.002938 |
| 12 | 1.000196 | 1.000349 | 1.000545 | 1.001230 | 1.002194 | 1.003444 |
| 13 | 1.000201 | 1.000358 | 1.000560 | 1.001265 | 1.002265 | 1.003569 |
| 14 | 1.000170 | 1.000302 | 1.000473 | 1.001072 | 1.001925 | 1.003047 |
| 15 | 1.000092 | 1.000164 | 1.000256 | 1.000582 | 1.001049 | 1.001668 |
| 16 | 0.999967 | 0.999941 | 0.999908 | 0.999793 | 0.999633 | 0.999426 |

## TABLE I-A LONG SOLENOID RATIOS

L = 1.828

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999989 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 02 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999990 | 0.999983 |
| 03 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999986 |
| 04 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999990 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 | 1.000004 |
| 07 | 1.000001 | 1.000002 | 1.000003 | 1.000005 | 1.000008 | 1.000014 |
| 08 | 1.000002 | 1.000004 | 1.000007 | 1.000010 | 1.000015 | 1.000027 |
| 09 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000024 | 1.000042 |
| 10 | 1.000004 | 1.000008 | 1.000015 | 1.000023 | 1.000033 | 1.000059 |
| 11 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 12 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 13 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000041 |
| 16 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999985 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999957 | 0.999924 | 0.999881 | 0.999732 | 0.999521 | 0.999248 |
| 01 | 0.999958 | 0.999926 | 0.999884 | 0.999739 | 0.999534 | 0.999268 |
| 02 | 0.999962 | 0.999932 | 0.999894 | 0.999761 | 0.999572 | 0.999327 |
| 03 | 0.999968 | 0.999943 | 0.999911 | 0.999799 | 0.999640 | 0.999433 |
| 04 | 0.999977 | 0.999960 | 0.999937 | 0.999857 | 0.999743 | 0.999591 |
| 05 | 0.999991 | 0.999983 | 0.999974 | 0.999939 | 0.999887 | 0.999815 |
| 06 | 1.000008 | 1.000015 | 1.000023 | 1.000049 | 1.000081 | 1.000117 |
| 07 | 1.000031 | 1.000055 | 1.000086 | 1.000192 | 1.000335 | 1.000511 |
| 08 | 1.000060 | 1.000107 | 1.000166 | 1.000371 | 1.000653 | 1.001008 |
| 09 | 1.000094 | 1.000167 | 1.000261 | 1.000586 | 1.001035 | 1.001605 |
| 10 | 1.000132 | 1.000235 | 1.000367 | 1.000824 | 1.001460 | 1.002273 |
| 11 | 1.000169 | 1.000300 | 1.000469 | 1.001056 | 1.001878 | 1.002935 |
| 12 | 1.000196 | 1.000349 | 1.000545 | 1.001230 | 1.002194 | 1.003442 |
| 13 | 1.000201 | 1.000358 | 1.000560 | 1.001266 | 1.002265 | 1.003570 |
| 14 | 1.000170 | 1.000303 | 1.000474 | 1.001073 | 1.001927 | 1.003049 |
| 15 | 1.000092 | 1.000164 | 1.000257 | 1.000583 | 1.001051 | 1.001671 |
| 16 | 0.999967 | 0.999941 | 0.999908 | 0.999794 | 0.999633 | 0.999427 |

## TABLE I-A LONG SOLENOID RATIOS

L = 2.000

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999988 | 0.999979 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999988 | 0.999979 |
| 02 | 0.999999 | 0.999997 | 0.999995 | 0.999992 | 0.999989 | 0.999980 |
| 03 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999990 | 0.999982 |
| 04 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999986 |
| 05 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999990 |
| 06 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 07 | 1.000000 | 1.000001 | 1.000002 | 1.000002 | 1.000003 | 1.000006 |
| 08 | 1.000001 | 1.000003 | 1.000004 | 1.000007 | 1.000010 | 1.000018 |
| 09 | 1.000002 | 1.000005 | 1.000008 | 1.000013 | 1.000018 | 1.000033 |
| 10 | 1.000003 | 1.000007 | 1.000013 | 1.000020 | 1.000028 | 1.000050 |
| 11 | 1.000004 | 1.000010 | 1.000017 | 1.000027 | 1.000039 | 1.000068 |
| 12 | 1.000005 | 1.000012 | 1.000021 | 1.000033 | 1.000047 | 1.000084 |
| 13 | 1.000006 | 1.000013 | 1.000023 | 1.000036 | 1.000051 | 1.000091 |
| 14 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000045 | 1.000081 |
| 15 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000046 |
| 16 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999952 | 0.999915 | 0.999867 | 0.999699 | 0.999464 | 0.999161 |
| 01 | 0.999953 | 0.999916 | 0.999869 | 0.999705 | 0.999474 | 0.999175 |
| 02 | 0.999956 | 0.999921 | 0.999876 | 0.999721 | 0.999503 | 0.999220 |
| 03 | 0.999960 | 0.999929 | 0.999890 | 0.999751 | 0.999555 | 0.999301 |
| 04 | 0.999968 | 0.999942 | 0.999910 | 0.999796 | 0.999636 | 0.999426 |
| 05 | 0.999978 | 0.999961 | 0.999939 | 0.999863 | 0.999753 | 0.999607 |
| 06 | 0.999993 | 0.999988 | 0.999981 | 0.999955 | 0.999916 | 0.999861 |
| 07 | 1.000013 | 1.000024 | 1.000037 | 1.000081 | 1.000138 | 1.000205 |
| 08 | 1.000040 | 1.000071 | 1.000110 | 1.000246 | 1.000431 | 1.000660 |
| 09 | 1.000073 | 1.000130 | 1.000203 | 1.000454 | 1.000800 | 1.001238 |
| 10 | 1.000113 | 1.000200 | 1.000312 | 1.000700 | 1.001240 | 1.001926 |
| 11 | 1.000154 | 1.000274 | 1.000428 | 1.000962 | 1.001709 | 1.002666 |
| 12 | 1.000190 | 1.000337 | 1.000527 | 1.001187 | 1.002116 | 1.003315 |
| 13 | 1.000205 | 1.000364 | 1.000570 | 1.001287 | 1.002301 | 1.003622 |
| 14 | 1.000181 | 1.000323 | 1.000506 | 1.001145 | 1.002054 | 1.003248 |
| 15 | 1.000104 | 1.000186 | 1.000291 | 1.000661 | 1.001190 | 1.001890 |
| 16 | 0.999971 | 0.999948 | 0.999919 | 0.999818 | 0.999677 | 0.999496 |

# TABLE I-A LONG SOLENOID RATIOS

L = 3.000

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999981 |
| 01 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999981 |
| 02 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999981 |
| 03 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 04 | 0.999999 | 0.999997 | 0.999995 | 0.999993 | 0.999990 | 0.999982 |
| 05 | 0.999999 | 0.999998 | 0.999996 | 0.999993 | 0.999990 | 0.999983 |
| 06 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999991 | 0.999984 |
| 07 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |
| 08 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999991 |
| 09 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 0.999999 | 0.999999 |
| 10 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000006 | 1.000011 |
| 11 | 1.000002 | 1.000004 | 1.000007 | 1.000012 | 1.000017 | 1.000030 |
| 12 | 1.000003 | 1.000008 | 1.000014 | 1.000021 | 1.000031 | 1.000054 |
| 13 | 1.000005 | 1.000011 | 1.000020 | 1.000032 | 1.000046 | 1.000081 |
| 14 | 1.000006 | 1.000013 | 1.000024 | 1.000037 | 1.000053 | 1.000095 |
| 15 | 1.000004 | 1.000010 | 1.000018 | 1.000028 | 1.000040 | 1.000071 |
| 16 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 0.999958 | 0.999925 | 0.999883 | 0.999738 | 0.999533 | 0.999271 |
| 01 | 0.999958 | 0.999925 | 0.999883 | 0.999738 | 0.999534 | 0.999272 |
| 02 | 0.999958 | 0.999926 | 0.999884 | 0.999738 | 0.999535 | 0.999274 |
| 03 | 0.999958 | 0.999926 | 0.999885 | 0.999741 | 0.999539 | 0.999279 |
| 04 | 0.999959 | 0.999928 | 0.999887 | 0.999746 | 0.999547 | 0.999292 |
| 05 | 0.999961 | 0.999931 | 0.999892 | 0.999756 | 0.999566 | 0.999321 |
| 06 | 0.999964 | 0.999936 | 0.999901 | 0.999776 | 0.999601 | 0.999375 |
| 07 | 0.999970 | 0.999947 | 0.999917 | 0.999812 | 0.999665 | 0.999474 |
| 08 | 0.999980 | 0.999965 | 0.999945 | 0.999876 | 0.999777 | 0.999647 |
| 09 | 0.999997 | 0.999995 | 0.999993 | 0.999982 | 0.999965 | 0.999938 |
| 10 | 1.000025 | 1.000044 | 1.000069 | 1.000153 | 1.000267 | 1.000407 |
| 11 | 1.000066 | 1.000118 | 1.000184 | 1.000411 | 1.000724 | 1.001119 |
| 12 | 1.000122 | 1.000217 | 1.000339 | 1.000761 | 1.001347 | 1.002094 |
| 13 | 1.000182 | 1.000324 | 1.000506 | 1.001139 | 1.002026 | 1.003167 |
| 14 | 1.000213 | 1.000380 | 1.000594 | 1.001341 | 1.002397 | 1.003771 |
| 15 | 1.000160 | 1.000286 | 1.000447 | 1.001013 | 1.001818 | 1.002878 |
| 16 | 0.999985 | 0.999974 | 0.999959 | 0.999907 | 0.999834 | 0.999741 |

TABLE I-A LONG SOLENOID RATIOS

L = 4.000

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |
| 01 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |
| 02 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |
| 03 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 | 0.999987 |
| 04 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 | 0.999986 |
| 05 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999986 |
| 06 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999986 |
| 07 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999992 | 0.999986 |
| 08 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 | 0.999986 |
| 09 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 10 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999994 |
| 11 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000005 |
| 12 | 1.000002 | 1.000003 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 13 | 1.000004 | 1.000008 | 1.000014 | 1.000022 | 1.000032 | 1.000056 |
| 14 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000051 | 1.000090 |
| 15 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 16 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999971 | 0.999948 | 0.999919 | 0.999818 | 0.999677 | 0.999496 |
| 01 | 0.999971 | 0.999948 | 0.999919 | 0.999818 | 0.999676 | 0.999493 |
| 02 | 0.999970 | 0.999947 | 0.999918 | 0.999815 | 0.999671 | 0.999487 |
| 03 | 0.999970 | 0.999946 | 0.999916 | 0.999811 | 0.999664 | 0.999476 |
| 04 | 0.999969 | 0.999945 | 0.999914 | 0.999806 | 0.999655 | 0.999462 |
| 05 | 0.999968 | 0.999943 | 0.999911 | 0.999801 | 0.999646 | 0.999447 |
| 06 | 0.999968 | 0.999942 | 0.999910 | 0.999797 | 0.999639 | 0.999436 |
| 07 | 0.999968 | 0.999942 | 0.999910 | 0.999797 | 0.999640 | 0.999436 |
| 08 | 0.999969 | 0.999945 | 0.999915 | 0.999808 | 0.999658 | 0.999465 |
| 09 | 0.999975 | 0.999955 | 0.999929 | 0.999840 | 0.999715 | 0.999552 |
| 10 | 0.999986 | 0.999976 | 0.999962 | 0.999914 | 0.999845 | 0.999753 |
| 11 | 1.000011 | 1.000019 | 1.000030 | 1.000065 | 1.000112 | 1.000167 |
| 12 | 1.000056 | 1.000099 | 1.000154 | 1.000345 | 1.000608 | 1.000938 |
| 13 | 1.000127 | 1.000225 | 1.000351 | 1.000788 | 1.001396 | 1.002170 |
| 14 | 1.000202 | 1.000360 | 1.000562 | 1.001266 | 1.002256 | 1.003534 |
| 15 | 1.000195 | 1.000347 | 1.000544 | 1.001231 | 1.002206 | 1.003483 |
| 16 | 0.999991 | 0.999984 | 0.999976 | 0.999945 | 0.999902 | 0.999847 |

TABLE I-A LONG SOLENOID RATIOS

L = 5.000

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999991 |
| 01 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999991 |
| 02 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999991 |
| 03 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999990 |
| 04 | 0.999999 | 0.999999 | 0.999997 | 0.999996 | 0.999994 | 0.999990 |
| 05 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 06 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 07 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999988 |
| 08 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |
| 09 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999987 |
| 10 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 11 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 |
| 12 | 1.000000 | 1.000001 | 1.000001 | 1.000002 | 1.000003 | 1.000006 |
| 13 | 1.000002 | 1.000005 | 1.000008 | 1.000013 | 1.000018 | 1.000033 |
| 14 | 1.000005 | 1.000011 | 1.000019 | 1.000029 | 1.000042 | 1.000075 |
| 15 | 1.000006 | 1.000013 | 1.000024 | 1.000037 | 1.000053 | 1.000095 |
| 16 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999997 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 0.999980 | 0.999964 | 0.999943 | 0.999872 | 0.999773 | 0.999646 |
| 01 | 0.999979 | 0.999963 | 0.999943 | 0.999872 | 0.999772 | 0.999643 |
| 02 | 0.999979 | 0.999963 | 0.999942 | 0.999869 | 0.999767 | 0.999636 |
| 03 | 0.999978 | 0.999961 | 0.999940 | 0.999864 | 0.999759 | 0.999623 |
| 04 | 0.999977 | 0.999960 | 0.999937 | 0.999858 | 0.999747 | 0.999605 |
| 05 | 0.999976 | 0.999957 | 0.999933 | 0.999849 | 0.999732 | 0.999582 |
| 06 | 0.999974 | 0.999954 | 0.999929 | 0.999840 | 0.999715 | 0.999555 |
| 07 | 0.999973 | 0.999951 | 0.999924 | 0.999829 | 0.999697 | 0.999526 |
| 08 | 0.999971 | 0.999949 | 0.999921 | 0.999821 | 0.999682 | 0.999503 |
| 09 | 0.999971 | 0.999949 | 0.999920 | 0.999821 | 0.999681 | 0.999500 |
| 10 | 0.999974 | 0.999955 | 0.999929 | 0.999840 | 0.999715 | 0.999553 |
| 11 | 0.999985 | 0.999974 | 0.999959 | 0.999908 | 0.999834 | 0.999737 |
| 12 | 1.000013 | 1.000024 | 1.000037 | 1.000081 | 1.000140 | 1.000211 |
| 13 | 1.000073 | 1.000130 | 1.000203 | 1.000455 | 1.000803 | 1.001242 |
| 14 | 1.000169 | 1.000301 | 1.000470 | 1.001057 | 1.001878 | 1.002930 |
| 15 | 1.000214 | 1.000381 | 1.000596 | 1.001348 | 1.002412 | 1.003802 |
| 16 | 0.999994 | 0.999990 | 0.999984 | 0.999964 | 0.999936 | 0.999900 |

## TABLE I-A LONG SOLENOID RATIOS

L = 6.000

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 01 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 02 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 03 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 04 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999992 |
| 05 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 |
| 06 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999991 |
| 07 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999990 |
| 08 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 09 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999988 |
| 10 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999988 |
| 11 | 0.999999 | 0.999999 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 12 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 13 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000008 | 1.000015 |
| 14 | 1.000004 | 1.000008 | 1.000014 | 1.000023 | 1.000032 | 1.000058 |
| 15 | 1.000006 | 1.000014 | 1.000024 | 1.000038 | 1.000055 | 1.000098 |
| 16 | 1.000000 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999985 | 0.999974 | 0.999959 | 0.999907 | 0.999834 | 0.999741 |
| 01 | 0.999985 | 0.999973 | 0.999958 | 0.999906 | 0.999833 | 0.999739 |
| 02 | 0.999985 | 0.999973 | 0.999957 | 0.999904 | 0.999829 | 0.999733 |
| 03 | 0.999984 | 0.999971 | 0.999955 | 0.999900 | 0.999821 | 0.999721 |
| 04 | 0.999983 | 0.999970 | 0.999953 | 0.999894 | 0.999811 | 0.999704 |
| 05 | 0.999982 | 0.999967 | 0.999949 | 0.999886 | 0.999797 | 0.999682 |
| 06 | 0.999980 | 0.999965 | 0.999945 | 0.999875 | 0.999778 | 0.999654 |
| 07 | 0.999978 | 0.999961 | 0.999939 | 0.999863 | 0.999757 | 0.999620 |
| 08 | 0.999976 | 0.999957 | 0.999933 | 0.999849 | 0.999732 | 0.999581 |
| 09 | 0.999974 | 0.999953 | 0.999927 | 0.999836 | 0.999709 | 0.999545 |
| 10 | 0.999973 | 0.999952 | 0.999925 | 0.999831 | 0.999698 | 0.999528 |
| 11 | 0.999976 | 0.999957 | 0.999933 | 0.999850 | 0.999732 | 0.999580 |
| 12 | 0.999991 | 0.999983 | 0.999974 | 0.999940 | 0.999891 | 0.999826 |
| 13 | 1.000034 | 1.000060 | 1.000094 | 1.000209 | 1.000366 | 1.000562 |
| 14 | 1.000130 | 1.000231 | 1.000360 | 1.000808 | 1.001432 | 1.002227 |
| 15 | 1.000220 | 1.000392 | 1.000614 | 1.001386 | 1.002476 | 1.003895 |
| 16 | 0.999996 | 0.999993 | 0.999989 | 0.999975 | 0.999955 | 0.999930 |

# TABLE I-A LONG SOLENOID RATIOS

L = 7.000

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 01 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 02 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 03 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 04 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999994 |
| 05 | 1.000000 | 0.999999 | 0.999998 | 0.999998 | 0.999996 | 0.999994 |
| 06 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 07 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999992 |
| 08 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999991 |
| 09 | 0.999999 | 0.999999 | 0.999997 | 0.999996 | 0.999994 | 0.999990 |
| 10 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 11 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999993 | 0.999988 |
| 12 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999991 |
| 13 | 1.000000 | 1.000001 | 1.000001 | 1.000001 | 1.000002 | 1.000004 |
| 14 | 1.000003 | 1.000006 | 1.000010 | 1.000016 | 1.000023 | 1.000041 |
| 15 | 1.000006 | 1.000014 | 1.000024 | 1.000038 | 1.000054 | 1.000096 |
| 16 | 1.000000 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999999 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999989 | 0.999980 | 0.999969 | 0.999930 | 0.999875 | 0.999804 |
| 01 | 0.999989 | 0.999980 | 0.999968 | 0.999929 | 0.999874 | 0.999802 |
| 02 | 0.999988 | 0.999979 | 0.999967 | 0.999927 | 0.999870 | 0.999797 |
| 03 | 0.999988 | 0.999978 | 0.999966 | 0.999923 | 0.999864 | 0.999787 |
| 04 | 0.999987 | 0.999977 | 0.999964 | 0.999918 | 0.999855 | 0.999773 |
| 05 | 0.999986 | 0.999975 | 0.999961 | 0.999911 | 0.999842 | 0.999754 |
| 06 | 0.999984 | 0.999972 | 0.999956 | 0.999902 | 0.999826 | 0.999728 |
| 07 | 0.999982 | 0.999969 | 0.999951 | 0.999890 | 0.999805 | 0.999695 |
| 08 | 0.999980 | 0.999965 | 0.999945 | 0.999876 | 0.999779 | 0.999655 |
| 09 | 0.999977 | 0.999960 | 0.999937 | 0.999859 | 0.999749 | 0.999609 |
| 10 | 0.999975 | 0.999955 | 0.999930 | 0.999843 | 0.999721 | 0.999564 |
| 11 | 0.999974 | 0.999954 | 0.999928 | 0.999837 | 0.999710 | 0.999547 |
| 12 | 0.999980 | 0.999964 | 0.999944 | 0.999874 | 0.999775 | 0.999646 |
| 13 | 1.000008 | 1.000014 | 1.000022 | 1.000047 | 1.000080 | 1.000119 |
| 14 | 1.000092 | 1.000164 | 1.000256 | 1.000573 | 1.001013 | 1.001570 |
| 15 | 1.000217 | 1.000386 | 1.000604 | 1.001362 | 1.002430 | 1.003813 |
| 16 | 0.999997 | 0.999995 | 0.999992 | 0.999981 | 0.999967 | 0.999948 |

TABLE I-A LONG SOLENOID RATIOS

L = 8.000

| n | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 01 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 02 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 03 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 04 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 06 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999994 |
| 07 | 1.000000 | 0.999999 | 0.999998 | 0.999998 | 0.999996 | 0.999994 |
| 08 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 09 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999992 |
| 10 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999994 | 0.999990 |
| 11 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 12 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 13 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999996 |
| 14 | 1.000002 | 1.000004 | 1.000007 | 1.000011 | 1.000015 | 1.000027 |
| 15 | 1.000006 | 1.000013 | 1.000023 | 1.000036 | 1.000052 | 1.000092 |
| 16 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 0.999999 | 0.999999 |

| n | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999991 | 0.999984 | 0.999976 | 0.999945 | 0.999902 | 0.999847 |
| 01 | 0.999991 | 0.999984 | 0.999975 | 0.999944 | 0.999901 | 0.999846 |
| 02 | 0.999991 | 0.999984 | 0.999975 | 0.999943 | 0.999898 | 0.999841 |
| 03 | 0.999990 | 0.999983 | 0.999973 | 0.999940 | 0.999893 | 0.999833 |
| 04 | 0.999990 | 0.999982 | 0.999971 | 0.999936 | 0.999885 | 0.999821 |
| 05 | 0.999989 | 0.999980 | 0.999969 | 0.999930 | 0.999875 | 0.999805 |
| 06 | 0.999987 | 0.999978 | 0.999965 | 0.999922 | 0.999861 | 0.999782 |
| 07 | 0.999986 | 0.999975 | 0.999960 | 0.999911 | 0.999842 | 0.999753 |
| 08 | 0.999984 | 0.999971 | 0.999954 | 0.999898 | 0.999818 | 0.999716 |
| 09 | 0.999981 | 0.999966 | 0.999947 | 0.999881 | 0.999788 | 0.999669 |
| 10 | 0.999978 | 0.999960 | 0.999938 | 0.999861 | 0.999753 | 0.999614 |
| 11 | 0.999975 | 0.999955 | 0.999930 | 0.999843 | 0.999721 | 0.999565 |
| 12 | 0.999976 | 0.999957 | 0.999932 | 0.999848 | 0.999729 | 0.999576 |
| 13 | 0.999992 | 0.999986 | 0.999978 | 0.999949 | 0.999906 | 0.999849 |
| 14 | 1.000061 | 1.000108 | 1.000168 | 1.000375 | 1.000661 | 1.001020 |
| 15 | 1.000206 | 1.000367 | 1.000574 | 1.001293 | 1.002302 | 1.003606 |
| 16 | 0.999998 | 0.999996 | 0.999994 | 0.999986 | 0.999974 | 0.999960 |

TABLE I-A LONG SOLENOID RATIOS

L = 9.000

| n \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 01 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 02 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 03 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 04 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999998 | 0.999996 |
| 05 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 06 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 07 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 08 | 1.000000 | 0.999999 | 0.999998 | 0.999998 | 0.999997 | 0.999994 |
| 09 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 10 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 | 0.999991 |
| 11 | 0.999999 | 0.999999 | 0.999997 | 0.999996 | 0.999994 | 0.999990 |
| 12 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 13 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999992 |
| 14 | 1.000001 | 1.000002 | 1.000004 | 1.000006 | 1.000009 | 1.000016 |
| 15 | 1.000005 | 1.000012 | 1.000021 | 1.000033 | 1.000048 | 1.000085 |
| 16 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 0.999999 |

| n \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 00 | 0.999993 | 0.999987 | 0.999980 | 0.999956 | 0.999922 | 0.999878 |
| 01 | 0.999993 | 0.999987 | 0.999980 | 0.999955 | 0.999921 | 0.999876 |
| 02 | 0.999993 | 0.999987 | 0.999980 | 0.999954 | 0.999918 | 0.999873 |
| 03 | 0.999992 | 0.999986 | 0.999979 | 0.999952 | 0.999914 | 0.999866 |
| 04 | 0.999992 | 0.999985 | 0.999977 | 0.999948 | 0.999908 | 0.999856 |
| 05 | 0.999991 | 0.999984 | 0.999975 | 0.999943 | 0.999899 | 0.999842 |
| 06 | 0.999990 | 0.999982 | 0.999972 | 0.999936 | 0.999887 | 0.999823 |
| 07 | 0.999988 | 0.999979 | 0.999968 | 0.999927 | 0.999870 | 0.999797 |
| 08 | 0.999986 | 0.999976 | 0.999962 | 0.999915 | 0.999849 | 0.999764 |
| 09 | 0.999984 | 0.999971 | 0.999955 | 0.999899 | 0.999820 | 0.999720 |
| 10 | 0.999981 | 0.999966 | 0.999946 | 0.999879 | 0.999785 | 0.999664 |
| 11 | 0.999977 | 0.999959 | 0.999936 | 0.999856 | 0.999744 | 0.999601 |
| 12 | 0.999975 | 0.999955 | 0.999930 | 0.999843 | 0.999720 | 0.999562 |
| 13 | 0.999983 | 0.999970 | 0.999952 | 0.999892 | 0.999807 | 0.999696 |
| 14 | 1.000035 | 1.000063 | 1.000098 | 1.000219 | 1.000384 | 1.000590 |
| 15 | 1.000191 | 1.000339 | 1.000530 | 1.001193 | 1.002121 | 1.003316 |
| 16 | 0.999998 | 0.999997 | 0.999995 | 0.999989 | 0.999980 | 0.999968 |

# TABLE I-A LONG SOLENOID RATIOS

L = 10.000

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999997 |
| 01 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999997 |
| 02 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 03 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 04 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 05 | 1.000000 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 |
| 06 | 1.000000 | 0.999999 | 0.999999 | 0.999999 | 0.999998 | 0.999996 |
| 07 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999998 | 0.999996 |
| 08 | 1.000000 | 0.999999 | 0.999999 | 0.999998 | 0.999997 | 0.999995 |
| 09 | 1.000000 | 0.999999 | 0.999998 | 0.999998 | 0.999997 | 0.999994 |
| 10 | 1.000000 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999993 |
| 11 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999991 |
| 12 | 0.999999 | 0.999998 | 0.999997 | 0.999996 | 0.999994 | 0.999989 |
| 13 | 0.999999 | 0.999999 | 0.999998 | 0.999996 | 0.999995 | 0.999990 |
| 14 | 1.000000 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000007 |
| 15 | 1.000005 | 1.000011 | 1.000019 | 1.000030 | 1.000043 | 1.000076 |
| 16 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 0.999999 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| n | | | | | | |
| 00 | 0.999994 | 0.999990 | 0.999984 | 0.999964 | 0.999936 | 0.999900 |
| 01 | 0.999994 | 0.999990 | 0.999984 | 0.999964 | 0.999935 | 0.999899 |
| 02 | 0.999994 | 0.999989 | 0.999983 | 0.999962 | 0.999933 | 0.999896 |
| 03 | 0.999994 | 0.999989 | 0.999982 | 0.999960 | 0.999930 | 0.999890 |
| 04 | 0.999993 | 0.999988 | 0.999981 | 0.999957 | 0.999924 | 0.999881 |
| 05 | 0.999992 | 0.999987 | 0.999979 | 0.999953 | 0.999917 | 0.999870 |
| 06 | 0.999992 | 0.999985 | 0.999977 | 0.999947 | 0.999906 | 0.999853 |
| 07 | 0.999990 | 0.999983 | 0.999973 | 0.999939 | 0.999892 | 0.999831 |
| 08 | 0.999989 | 0.999980 | 0.999968 | 0.999929 | 0.999873 | 0.999802 |
| 09 | 0.999986 | 0.999976 | 0.999962 | 0.999914 | 0.999847 | 0.999761 |
| 10 | 0.999983 | 0.999970 | 0.999953 | 0.999895 | 0.999813 | 0.999708 |
| 11 | 0.999979 | 0.999963 | 0.999943 | 0.999871 | 0.999770 | 0.999641 |
| 12 | 0.999976 | 0.999957 | 0.999932 | 0.999848 | 0.999729 | 0.999576 |
| 13 | 0.999978 | 0.999961 | 0.999939 | 0.999863 | 0.999755 | 0.999616 |
| 14 | 1.000017 | 1.000029 | 1.000046 | 1.000101 | 1.000175 | 1.000266 |
| 15 | 1.000172 | 1.000306 | 1.000478 | 1.001074 | 1.001908 | 1.002977 |
| 16 | 0.999999 | 0.999997 | 0.999996 | 0.999991 | 0.999984 | 0.999974 |

## TABLE I-B MAGNETIC FIELD vs. AXIAL POSITION
(Long Solenoid Values)

Values of $U_S$ calculated from (20) are tabulated (see section 3G for discussion). The same relative dimensions occur in this table as were used in Table I-A except that the thickness parameter T does not enter since this is a calculation for ideal elements. The format is similar to that used in Table I-A. Rows are identified by the axial position index n running from 00 through 16 and columns are headed by the length parameter L (refer to title page preceding Table I-A).

EXAMPLE: It is desired to find $U_S$ at point P for the ideal solenoid equivalent to the thick solenoid used in the example at the beginning of Table I-A. By reference to the earlier example it is seen that

| | |
|---|---|
| Radius | R = 10 cm |
| Half-length | $\lambda$ = 20 cm |
| Axial displacement | X = 15 cm |

and

L = 2

n = 12

To find the value look in row 12 of the column headed 2.000. The value of $U_S$ is 0.787508. In other words, for an ideal solenoid of this geometry and at the axial point P specified, the magnetic field is 78.7508% of the value of the magnetic field at the center of the solenoid.

TABLE I-B MAGNETIC FIELD vs. AXIAL POSITION
(Long Solenoid Values)

| n | L | 0.855 | 0.860 | 0.865 | 0.870 | 0.875 | 1.000 |
|---|---|---|---|---|---|---|---|
| 00 | | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 01 | | 0.998571 | 0.998568 | 0.998566 | 0.998563 | 0.998561 | 0.998535 |
| 02 | | 0.994283 | 0.994272 | 0.994262 | 0.994253 | 0.994243 | 0.994131 |
| 03 | | 0.987140 | 0.987115 | 0.987092 | 0.987069 | 0.987047 | 0.986770 |
| 04 | | 0.977148 | 0.977102 | 0.977058 | 0.977016 | 0.976975 | 0.976422 |
| 05 | | 0.964321 | 0.964246 | 0.964173 | 0.964103 | 0.964035 | 0.963052 |
| 06 | | 0.948687 | 0.948573 | 0.948461 | 0.948353 | 0.948248 | 0.946629 |
| 07 | | 0.930291 | 0.930125 | 0.929962 | 0.929805 | 0.929652 | 0.927135 |
| 08 | | 0.909202 | 0.908970 | 0.908744 | 0.908524 | 0.908308 | 0.904576 |
| 09 | | 0.885521 | 0.885209 | 0.884904 | 0.884606 | 0.884314 | 0.878998 |
| 10 | | 0.859386 | 0.858978 | 0.858578 | 0.858187 | 0.857802 | 0.850495 |
| 11 | | 0.830976 | 0.830458 | 0.829947 | 0.829446 | 0.828953 | 0.819230 |
| 12 | | 0.800518 | 0.799873 | 0.799238 | 0.798612 | 0.797995 | 0.785439 |
| 13 | | 0.768281 | 0.767497 | 0.766723 | 0.765959 | 0.765206 | 0.749439 |
| 14 | | 0.734577 | 0.733643 | 0.732720 | 0.731808 | 0.730907 | 0.711624 |
| 15 | | 0.699751 | 0.698661 | 0.697583 | 0.696516 | 0.695460 | 0.672458 |
| 16 | | 0.664174 | 0.662926 | 0.661690 | 0.660466 | 0.659254 | 0.632456 |

| n | L | 1.300 | 1.350 | 1.380 | 1.383 | 1.385 | 1.388 |
|---|---|---|---|---|---|---|---|
| 00 | | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 01 | | 0.998630 | 0.998657 | 0.998675 | 0.998677 | 0.998678 | 0.998680 |
| 02 | | 0.994495 | 0.994604 | 0.994673 | 0.994680 | 0.994685 | 0.994692 |
| 03 | | 0.987527 | 0.987764 | 0.987914 | 0.987929 | 0.987939 | 0.987955 |
| 04 | | 0.977613 | 0.978012 | 0.978266 | 0.978292 | 0.978310 | 0.978336 |
| 05 | | 0.964601 | 0.965179 | 0.965551 | 0.965589 | 0.965614 | 0.965653 |
| 06 | | 0.948310 | 0.949059 | 0.949548 | 0.949598 | 0.949632 | 0.949682 |
| 07 | | 0.928542 | 0.929423 | 0.930008 | 0.930069 | 0.930109 | 0.930170 |
| 08 | | 0.905099 | 0.906036 | 0.906675 | 0.906742 | 0.906786 | 0.906854 |
| 09 | | 0.877814 | 0.878686 | 0.879310 | 0.879376 | 0.879421 | 0.879488 |
| 10 | | 0.846586 | 0.847227 | 0.847738 | 0.847794 | 0.847831 | 0.847889 |
| 11 | | 0.811418 | 0.811621 | 0.811893 | 0.811926 | 0.811949 | 0.811983 |
| 12 | | 0.772466 | 0.771991 | 0.771880 | 0.771876 | 0.771874 | 0.771871 |
| 13 | | 0.730072 | 0.728675 | 0.728028 | 0.727970 | 0.727933 | 0.727878 |
| 14 | | 0.684792 | 0.682247 | 0.680922 | 0.680797 | 0.680715 | 0.680593 |
| 15 | | 0.637384 | 0.633520 | 0.631408 | 0.631205 | 0.631071 | 0.630870 |
| 16 | | 0.588769 | 0.583498 | 0.580544 | 0.580257 | 0.580066 | 0.579781 |

TABLE I-B MAGNETIC FIELD vs. AXIAL POSITION
(Long Solenoid Values)

| n | L | 1.390 | 1.393 | 1.395 | 1.398 | 1.400 | 1.500 |
|---|---|---|---|---|---|---|---|
| 00 | | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 01 | | 0.998681 | 0.998683 | 0.998684 | 0.998686 | 0.998687 | 0.998749 |
| 02 | | 0.994696 | 0.994703 | 0.994708 | 0.994715 | 0.994720 | 0.994966 |
| 03 | | 0.987965 | 0.987981 | 0.987991 | 0.988006 | 0.988017 | 0.988556 |
| 04 | | 0.978353 | 0.978380 | 0.978397 | 0.978424 | 0.978441 | 0.979365 |
| 05 | | 0.965679 | 0.965717 | 0.965743 | 0.965782 | 0.965808 | 0.967177 |
| 06 | | 0.949716 | 0.949767 | 0.949801 | 0.949853 | 0.949887 | 0.951718 |
| 07 | | 0.930211 | 0.930273 | 0.930315 | 0.930377 | 0.930419 | 0.932671 |
| 08 | | 0.906899 | 0.906968 | 0.907014 | 0.907083 | 0.907129 | 0.909688 |
| 09 | | 0.879533 | 0.879602 | 0.879648 | 0.879717 | 0.879764 | 0.882419 |
| 10 | | 0.847927 | 0.847986 | 0.848026 | 0.848086 | 0.848126 | 0.850567 |
| 11 | | 0.812007 | 0.812044 | 0.812068 | 0.812107 | 0.812133 | 0.813945 |
| 12 | | 0.771870 | 0.771870 | 0.771870 | 0.771872 | 0.771873 | 0.772556 |
| 13 | | 0.727842 | 0.727789 | 0.727754 | 0.727703 | 0.727670 | 0.726682 |
| 14 | | 0.680512 | 0.680392 | 0.680313 | 0.680195 | 0.680117 | 0.676944 |
| 15 | | 0.630737 | 0.630539 | 0.630407 | 0.630211 | 0.630081 | 0.624319 |
| 16 | | 0.579592 | 0.579309 | 0.579121 | 0.578841 | 0.578655 | 0.570088 |

| n | L | 1.700 | 1.816 | 1.818 | 1.820 | 1.822 | 1.824 |
|---|---|---|---|---|---|---|---|
| 00 | | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 01 | | 0.998878 | 0.998951 | 0.998952 | 0.998953 | 0.998954 | 0.998956 |
| 02 | | 0.995476 | 0.995766 | 0.995771 | 0.995776 | 0.995780 | 0.995785 |
| 03 | | 0.989686 | 0.990331 | 0.990342 | 0.990353 | 0.990364 | 0.990375 |
| 04 | | 0.981323 | 0.982454 | 0.982473 | 0.982492 | 0.982511 | 0.982531 |
| 05 | | 0.970127 | 0.971854 | 0.971883 | 0.971913 | 0.971942 | 0.971972 |
| 06 | | 0.955757 | 0.958161 | 0.958202 | 0.958243 | 0.958284 | 0.958326 |
| 07 | | 0.937792 | 0.940907 | 0.940961 | 0.941015 | 0.941069 | 0.941123 |
| 08 | | 0.915744 | 0.919535 | 0.919601 | 0.919667 | 0.919734 | 0.919800 |
| 09 | | 0.889083 | 0.893414 | 0.893490 | 0.893566 | 0.893643 | 0.893719 |
| 10 | | 0.857285 | 0.861885 | 0.861968 | 0.862050 | 0.862132 | 0.862215 |
| 11 | | 0.819917 | 0.824357 | 0.824438 | 0.824519 | 0.824600 | 0.824682 |
| 12 | | 0.776756 | 0.780438 | 0.780507 | 0.780577 | 0.780647 | 0.780717 |
| 13 | | 0.727931 | 0.730128 | 0.730174 | 0.730220 | 0.730265 | 0.730312 |
| 14 | | 0.674068 | 0.674021 | 0.674028 | 0.674036 | 0.674045 | 0.674053 |
| 15 | | 0.616362 | 0.613422 | 0.613380 | 0.613339 | 0.613297 | 0.613256 |
| 16 | | 0.556519 | 0.550317 | 0.550219 | 0.550121 | 0.550023 | 0.549926 |

TABLE I-B MAGNETIC FIELD vs. AXIAL POSITION
(Long Solenoid Values)

| n \ L | 1.826 | 1.828 | 2.000 | 3.000 | 4.000 | 5.000 |
|---|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 01 | 0.998957 | 0.998958 | 0.999059 | 0.999470 | 0.999674 | 0.999782 |
| 02 | 0.995790 | 0.995795 | 0.996199 | 0.997849 | 0.998673 | 0.999113 |
| 03 | 0.990386 | 0.990397 | 0.991301 | 0.995041 | 0.996930 | 0.997943 |
| 04 | 0.982550 | 0.982569 | 0.984165 | 0.990872 | 0.994320 | 0.996183 |
| 05 | 0.972001 | 0.972031 | 0.974492 | 0.985073 | 0.990644 | 0.993689 |
| 06 | 0.958367 | 0.958408 | 0.961879 | 0.977251 | 0.985601 | 0.990235 |
| 07 | 0.941176 | 0.941230 | 0.945804 | 0.966837 | 0.978734 | 0.985474 |
| 08 | 0.919866 | 0.919932 | 0.925615 | 0.953025 | 0.969353 | 0.978861 |
| 09 | 0.893796 | 0.893872 | 0.900537 | 0.934677 | 0.956398 | 0.969518 |
| 10 | 0.862298 | 0.862380 | 0.869707 | 0.910215 | 0.938224 | 0.955997 |
| 11 | 0.824763 | 0.824845 | 0.832263 | 0.877524 | 0.912274 | 0.935834 |
| 12 | 0.780787 | 0.780858 | 0.787508 | 0.833966 | 0.874643 | 0.904771 |
| 13 | 0.730358 | 0.730405 | 0.735172 | 0.776744 | 0.819787 | 0.855569 |
| 14 | 0.674062 | 0.674071 | 0.675723 | 0.703968 | 0.741356 | 0.777273 |
| 15 | 0.613216 | 0.613175 | 0.610621 | 0.616544 | 0.636151 | 0.659298 |
| 16 | 0.549829 | 0.549732 | 0.542326 | 0.519875 | 0.511408 | 0.507371 |

| n \ L | 6.000 | 7.000 | 8.000 | 9.000 | 10.000 |
|---|---|---|---|---|---|
| 00 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 01 | 0.999845 | 0.999884 | 0.999911 | 0.999929 | 0.999942 |
| 02 | 0.999368 | 0.999529 | 0.999636 | 0.999710 | 0.999764 |
| 03 | 0.998534 | 0.998906 | 0.999154 | 0.999327 | 0.999452 |
| 04 | 0.997277 | 0.997966 | 0.998426 | 0.998747 | 0.998979 |
| 05 | 0.995487 | 0.996624 | 0.997385 | 0.997917 | 0.998303 |
| 06 | 0.992995 | 0.994750 | 0.995928 | 0.996753 | 0.997353 |
| 07 | 0.989536 | 0.992136 | 0.993889 | 0.995121 | 0.996019 |
| 08 | 0.984681 | 0.988444 | 0.990997 | 0.992800 | 0.994117 |
| 09 | 0.977726 | 0.983107 | 0.986790 | 0.989407 | 0.991328 |
| 10 | 0.967460 | 0.975123 | 0.980440 | 0.984254 | 0.987072 |
| 11 | 0.951704 | 0.962630 | 02970346 | 0.975996 | 0.980201 |
| 12 | 0.926377 | 0.941931 | 0.953304 | 0.961784 | 0.968229 |
| 13 | 0.883627 | 0.905268 | 0.921960 | 0.934927 | 0.945108 |
| 14 | 0.809044 | 0.836212 | 0.859080 | 0.878200 | 0.894162 |
| 15 | 0.683015 | 0.706153 | 0.728193 | 0.748891 | 0.768147 |
| 16 | 0.505146 | 0.503793 | 0.502910 | 0.502302 | 0.501867 |

## TABLE II-A SHORT SOLENOID RATIOS

Values of $Q_s$ calculated from (15) are tabulated for the following relative dimensions (see section 3D and 3E for discussion). This table is similar to Table I-A except that a different range of L values is tabulated and the position parameter is treated differently.

Length Parameter $L = \lambda/R$ takes the following values.

| | | |
|---|---|---|
| 0.125 | 0.210 | 0.250 |
| 0.150 | 0.212 | 0.300 |
| 0.175 | 0.214 | 0.350 |
| 0.200 | 0.216 | 0.400 |
| 0.206 | 0.218 | 0.500 |
| 0.208 | 0.220 | 0.600 |

Thickness Parameter $T = t/R$ takes the following value for each value of L. (same as Table I-A)

| | |
|---|---|
| 0.010 | 0.060 |
| 0.015 | 0.080 |
| 0.020 | 0.100 |
| 0.025 | 0.150 |
| 0.030 | 0.200 |
| 0.040 | 0.250 |

Position Parameter $p = X/R$ takes the following values for each pair L and T values.

| | | |
|---|---|---|
| 0.00 | 1.00 | 3.00 |
| 0.10 | 1.25 | 4.00 |
| 0.20 | 1.50 | 6.00 |
| 0.40 | 1.75 | 8.00 |
| 0.60 | 2.00 | 10.00 |
| 0.80 | 2.50 | |

---

NOTE: The quantities X,R,t, and $\lambda$ are the actual dimensions of the solenoid (see figure 1).

EXAMPLE: Given a solenoid having the following dimensions:

Total length = 4 cm

Outside diameter = 12 cm

Inside diameter = 8 cm

Find $Q_S$ at a point P on the axis of this solenoid and located 15 cm from the center.

From the given dimensions:

Mean radius $R = 5$ cm

Half-length $\lambda = 2$ cm

Half-thickness $t = 1$ cm

Axial displacement $X = 15$ cm

Therefore:

$L = \lambda/R = 0.400$

$T = t/R = 0.200$

$p = X/R = 3.000$

To find value turn to page headed 0.400. Look in row opposite 3.00 of column headed 0.200. The value of $Q_S$ is 1.004021. In other words, for a thick solenoid of this geometry and at the axial point P specified, the magnetic field is 0.4021 % greater than the field produced at the same point by the equivalent ideal solenoid.

## TABLE II-A SHORT SOLENOID RATIOS

L = 0.125

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.000032 | 1.000072 | 1.000128 | 1.000200 | 1.000289 | 1.000513 |
| 0.10 | 1.000030 | 1.000067 | 1.000119 | 1.000186 | 1.000269 | 1.000478 |
| 0.20 | 1.000024 | 1.000053 | 1.000094 | 1.000147 | 1.000212 | 1.000377 |
| 0.40 | 1.000004 | 1.000010 | 1.000017 | 1.000027 | 1.000039 | 1.000069 |
| 0.60 | 0.999986 | 0.999968 | 0.999943 | 0.999911 | 0.999872 | 0.999772 |
| 0.80 | 0.999975 | 0.999943 | 0.999898 | 0.999841 | 0.999772 | 0.999594 |
| 1.00 | 0.999971 | 0.999935 | 0.999885 | 0.999820 | 0.999741 | 0.999539 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999955 | 0.999920 | 0.999875 | 0.999819 | 0.999679 |
| 1.75 | 0.999987 | 0.999970 | 0.999947 | 0.999917 | 0.999881 | 0.999788 |
| 2.00 | 0.999994 | 0.999985 | 0.999973 | 0.999957 | 0.999938 | 0.999891 |
| 2.50 | 1.000004 | 1.000008 | 1.000014 | 1.000022 | 1.000032 | 1.000056 |
| 3.00 | 1.000012 | 1.000025 | 1.000043 | 1.000068 | 1.000097 | 1.000172 |
| 4.00 | 1.000022 | 1.000045 | 1.000079 | 1.000122 | 1.000176 | 1.000312 |
| 6.00 | 1.000033 | 1.000065 | 1.000111 | 1.000170 | 1.000243 | 1.000430 |
| 8.00 | 1.000046 | 1.000079 | 1.000127 | 1.000193 | 1.000270 | 1.000477 |
| 10.00 | 1.000065 | 1.000087 | 1.000136 | 1.000206 | 1.000287 | 1.000504 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.001157 | 1.002059 | 1.003224 | 1.007306 | 1.013120 | 1.020769 |
| 0.10 | 1.001076 | 1.001915 | 1.002997 | 1.006786 | 1.012169 | 1.019229 |
| 0.20 | 1.000850 | 1.001512 | 1.002364 | 1.005336 | 1.009527 | 1.014968 |
| 0.40 | 1.000153 | 1.000271 | 1.000418 | 1.000907 | 1.001525 | 1.002200 |
| 0.60 | 0.999485 | 0.999082 | 0.998560 | 0.996719 | 0.994064 | 0.990517 |
| 0.80 | 0.999085 | 0.998373 | 0.997455 | 0.994257 | 0.989749 | 0.983902 |
| 1.00 | 0.998962 | 0.998156 | 0.997119 | 0.993525 | 0.988508 | 0.982086 |
| 1.25 | 0.999058 | 0.998327 | 0.997389 | 0.994148 | 0.989651 | 0.983941 |
| 1.50 | 0.999278 | 0.998717 | 0.997999 | 0.995520 | 0.992094 | 0.987762 |
| 1.75 | 0.999524 | 0.999154 | 0.998681 | 0.997051 | 0.994804 | 0.991976 |
| 2.00 | 0.999754 | 0.999564 | 0.999320 | 0.998484 | 0.997339 | 0.995911 |
| 2.50 | 1.000126 | 1.000224 | 1.000350 | 1.000795 | 1.001428 | 1.002263 |
| 3.00 | 1.000387 | 1.000689 | 1.001076 | 1.002424 | 1.004314 | 1.006750 |
| 4.00 | 1.000701 | 1.001246 | 1.001946 | 1.004377 | 1.007779 | 1.012150 |
| 6.00 | 1.000964 | 1.001713 | 1.002675 | 1.006017 | 1.010693 | 1.016701 |
| 8.00 | 1.001066 | 1.001892 | 1.002956 | 1.006646 | 1.011813 | 1.018452 |
| 10.00 | 1.001115 | 1.001980 | 1.003092 | 1.006949 | 1.012350 | 1.019292 |

## TABLE II-A SHORT SOLENOID RATIOS

L = 0.150

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.000032 | 1.000071 | 1.000126 | 1.000197 | 1.000284 | 1.000505 |
| 0.10 | 1.000029 | 1.000066 | 1.000118 | 1.000184 | 1.000265 | 1.000470 |
| 0.20 | 1.000023 | 1.000053 | 1.000093 | 1.000146 | 1.000210 | 1.000374 |
| 0.40 | 1.000005 | 1.000010 | 1.000018 | 1.000029 | 1.000041 | 1.000073 |
| 0.60 | 0.999986 | 0.999969 | 0.999945 | 0.999914 | 0.999876 | 0.999779 |
| 0.80 | 0.999975 | 0.999944 | 0.999900 | 0.999843 | 0.999775 | 0.999599 |
| 1.00 | 0.999971 | 0.999936 | 0.999885 | 0.999821 | 0.999742 | 0.999541 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999955 | 0.999919 | 0.999874 | 0.999819 | 0.999678 |
| 1.75 | 0.999987 | 0.999970 | 0.999947 | 0.999917 | 0.999880 | 0.999787 |
| 2.00 | 0.999993 | 0.999985 | 0.999972 | 0.999957 | 0.999938 | 0.999889 |
| 2.50 | 1.000004 | 1.000008 | 1.000014 | 1.000022 | 1.000031 | 1.000055 |
| 3.00 | 1.000011 | 1.000025 | 1.000043 | 1.000067 | 1.000097 | 1.000172 |
| 4.00 | 1.000021 | 1.000045 | 1.000079 | 1.000122 | 1.000175 | 1.000312 |
| 6.00 | 1.000032 | 1.000064 | 1.000109 | 1.000169 | 1.000242 | 1.000430 |
| 8.00 | 1.000043 | 1.000075 | 1.000124 | 1.000190 | 1.000271 | 1.000476 |
| 10.00 | 1.000054 | 1.000089 | 1.000133 | 1.000201 | 1.000282 | 1.000497 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.001137 | 1.002025 | 1.003170 | 1.007180 | 1.012889 | 1.020395 |
| 0.10 | 1.001059 | 1.001886 | 1.002952 | 1.006681 | 1.011978 | 1.018922 |
| 0.20 | 1.000842 | 1.001497 | 1.002342 | 1.005286 | 1.009438 | 1.014829 |
| 0.40 | 1.000164 | 1.000289 | 1.000448 | 1.000975 | 1.001651 | 1.002408 |
| 0.60 | 0.999502 | 0.999112 | 0.998607 | 0.996825 | 0.994254 | 0.990816 |
| 0.80 | 0.999098 | 0.998395 | 0.997489 | 0.994333 | 0.989881 | 0.984106 |
| 1.00 | 0.998968 | 0.998165 | 0.997134 | 0.993558 | 0.988564 | 0.982170 |
| 1.25 | 0.999058 | 0.998327 | 0.997388 | 0.994145 | 0.989646 | 0.983931 |
| 1.50 | 0.999275 | 0.998713 | 0.997991 | 0.995504 | 0.992064 | 0.987715 |
| 1.75 | 0.999520 | 0.999149 | 0.998672 | 0.997031 | 0.994769 | 0.991922 |
| 2.00 | 0.999751 | 0.999558 | 0.999312 | 0.998465 | 0.997307 | 0.995861 |
| 2.50 | 1.000124 | 1.000220 | 1.000345 | 1.000782 | 1.001407 | 1.002229 |
| 3.00 | 1.000386 | 1.000686 | 1.001073 | 1.002416 | 1.004300 | 1.006729 |
| 4.00 | 1.000700 | 1.001245 | 1.001944 | 1.004374 | 1.007773 | 1.012141 |
| 6.00 | 1.000964 | 1.001712 | 1.002675 | 1.006016 | 1.010692 | 1.016699 |
| 8.00 | 1.001066 | 1.001892 | 1.002955 | 1.006646 | 1.011812 | 1.018451 |
| 10.00 | 1.001116 | 1.001980 | 1.003090 | 1.006948 | 1.012350 | 1.019292 |

# TABLE II-A SHORT SOLENOID RATIOS

## L = 0.175

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000031 | 1.000070 | 1.000124 | 1.000193 | 1.000278 | 1.000495 |
| 0.10 | 1.000029 | 1.000065 | 1.000115 | 1.000180 | 1.000260 | 1.000462 |
| 0.20 | 1.000023 | 1.000052 | 1.000092 | 1.000144 | 1.000208 | 1.000370 |
| 0.40 | 1.000005 | 1.000011 | 1.000020 | 1.000031 | 1.000044 | 1.000078 |
| 0.60 | 0.999987 | 0.999970 | 0.999947 | 0.999917 | 0.999881 | 0.999788 |
| 0.80 | 0.999975 | 0.999945 | 0.999901 | 0.999846 | 0.999778 | 0.999606 |
| 1.00 | 0.999972 | 0.999936 | 0.999886 | 0.999822 | 0.999744 | 0.999544 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999955 | 0.999919 | 0.999873 | 0.999818 | 0.999676 |
| 1.75 | 0.999987 | 0.999970 | 0.999946 | 0.999916 | 0.999879 | 0.999785 |
| 2.00 | 0.999993 | 0.999984 | 0.999972 | 0.999956 | 0.999937 | 0.999888 |
| 2.50 | 1.000004 | 1.000008 | 1.000014 | 1.000021 | 1.000030 | 1.000054 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000067 | 1.000096 | 1.000171 |
| 4.00 | 1.000021 | 1.000045 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000032 | 1.000062 | 1.000109 | 1.000169 | 1.000243 | 1.000429 |
| 8.00 | 1.000035 | 1.000075 | 1.000124 | 1.000190 | 1.000270 | 1.000475 |
| 10.00 | 1.000055 | 1.000087 | 1.000137 | 1.000204 | 1.000287 | 1.000500 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001115 | 1.001984 | 1.003106 | 1.007035 | 1.012624 | 1.019966 |
| 0.10 | 1.001040 | 1.001852 | 1.002899 | 1.006560 | 1.011758 | 1.018568 |
| 0.20 | 1.000832 | 1.001480 | 1.002315 | 1.005226 | 1.009332 | 1.014663 |
| 0.40 | 1.000176 | 1.000310 | 1.000481 | 1.001053 | 1.001795 | 1.002644 |
| 0.60 | 0.999521 | 0.999147 | 0.998661 | 0.996948 | 0.994475 | 0.991165 |
| 0.80 | 0.999112 | 0.998420 | 0.997529 | 0.994422 | 0.990039 | 0.984349 |
| 1.00 | 0.998974 | 0.998177 | 0.997152 | 0.993597 | 0.988632 | 0.982272 |
| 1.25 | 0.999058 | 0.998326 | 0.997387 | 0.994143 | 0.989640 | 0.983921 |
| 1.50 | 0.999272 | 0.998707 | 0.997983 | 0.995484 | 0.992028 | 0.987659 |
| 1.75 | 0.999517 | 0.999142 | 0.998662 | 0.997008 | 0.994728 | 0.991857 |
| 2.00 | 0.999748 | 0.999552 | 0.999302 | 0.998444 | 0.997269 | 0.995802 |
| 2.50 | 1.000121 | 1.000216 | 1.000338 | 1.000768 | 1.001381 | 1.002189 |
| 3.00 | 1.000385 | 1.000684 | 1.001069 | 1.002407 | 1.004284 | 1.006704 |
| 4.00 | 1.000700 | 1.001244 | 1.001943 | 1.004370 | 1.007767 | 1.012131 |
| 6.00 | 1.000963 | 1.001712 | 1.002674 | 1.006015 | 1.010690 | 1.016696 |
| 8.00 | 1.001065 | 1.001892 | 1.002955 | 1.006646 | 1.011811 | 1.018450 |
| 10.00 | 1.001113 | 1.001979 | 1.003089 | 1.006948 | 1.012349 | 1.019291 |

# TABLE II-A SHORT SOLENOID RATIOS

## L = 0.200

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.000030 | 1.000068 | 1.000121 | 1.000189 | 1.000272 | 1.000484 |
| 0.10 | 1.000028 | 1.000064 | 1.000113 | 1.000177 | 1.000254 | 1.000453 |
| 0.20 | 1.000023 | 1.000051 | 1.000091 | 1.000142 | 1.000205 | 1.000365 |
| 0.40 | 1.000005 | 1.000012 | 1.000021 | 1.000033 | 1.000047 | 1.000084 |
| 0.60 | 0.999987 | 0.999972 | 0.999949 | 0.999921 | 0.999886 | 0.999798 |
| 0.80 | 0.999976 | 0.999946 | 0.999903 | 0.999849 | 0.999782 | 0.999613 |
| 1.00 | 0.999972 | 0.999936 | 0.999887 | 0.999823 | 0.999745 | 0.999547 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999919 | 0.999873 | 0.999817 | 0.999675 |
| 1.75 | 0.999987 | 0.999970 | 0.999946 | 0.999915 | 0.999878 | 0.999783 |
| 2.00 | 0.999993 | 0.999984 | 0.999972 | 0.999955 | 0.999936 | 0.999886 |
| 2.50 | 1.000004 | 1.000008 | 1.000013 | 1.000021 | 1.000030 | 1.000053 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000067 | 1.000096 | 1.000170 |
| 4.00 | 1.000021 | 1.000045 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000031 | 1.000063 | 1.000109 | 1.000169 | 1.000242 | 1.000429 |
| 8.00 | 1.000038 | 1.000074 | 1.000124 | 1.000188 | 1.000269 | 1.000476 |
| 10.00 | 1.000048 | 1.000081 | 1.000133 | 1.000199 | 1.000283 | 1.000497 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.001089 | 1.001939 | 1.003035 | 1.006873 | 1.012327 | 1.019485 |
| 0.10 | 1.001019 | 1.001814 | 1.002839 | 1.006424 | 1.011510 | 1.018168 |
| 0.20 | 1.000821 | 1.001461 | 1.002285 | 1.005157 | 1.009209 | 1.014471 |
| 0.40 | 1.000189 | 1.000334 | 1.000518 | 1.001138 | 1.001952 | 1.002903 |
| 0.60 | 0.999543 | 0.999186 | 0.998723 | 0.997088 | 0.994725 | 0.991561 |
| 0.80 | 0.999129 | 0.998450 | 0.997575 | 0.994525 | 0.990221 | 0.984629 |
| 1.00 | 0.998982 | 0.998190 | 0.997173 | 0.993643 | 0.988712 | 0.982392 |
| 1.25 | 0.999058 | 0.998326 | 0.997387 | 0.994141 | 0.989635 | 0.983911 |
| 1.50 | 0.999268 | 0.998701 | 0.997973 | 0.995461 | 0.991988 | 0.987596 |
| 1.75 | 0.999512 | 0.999134 | 0.998650 | 0.996981 | 0.994680 | 0.991783 |
| 2.00 | 0.999744 | 0.999545 | 0.999291 | 0.998419 | 0.997225 | 0.995734 |
| 2.50 | 1.000119 | 1.000211 | 1.000331 | 1.000751 | 1.001351 | 1.002143 |
| 3.00 | 1.000383 | 1.000681 | 1.001064 | 1.002396 | 1.004265 | 1.006674 |
| 4.00 | 1.000699 | 1.001242 | 1.001941 | 1.004366 | 1.007759 | 1.012119 |
| 6.00 | 1.000963 | 1.001712 | 1.002674 | 1.006014 | 1.010688 | 1.016694 |
| 8.00 | 1.001065 | 1.001891 | 1.002955 | 1.006645 | 1.011811 | 1.018449 |
| 10.00 | 1.001114 | 1.001979 | 1.003089 | 1.006948 | 1.012349 | 1.019291 |

## TABLE II-A SHORT SOLENOID RATIOS

L = 0.206

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000030 | 1.000068 | 1.000120 | 1.000188 | 1.000270 | 1.000481 |
| 0.10 | 1.000028 | 1.000063 | 1.000112 | 1.000176 | 1.000253 | 1.000450 |
| 0.20 | 1.000023 | 1.000051 | 1.000091 | 1.000142 | 1.000204 | 1.000364 |
| 0.40 | 1.000005 | 1.000012 | 1.000021 | 1.000034 | 1.000048 | 1.000086 |
| 0.60 | 0.999988 | 0.999972 | 0.999950 | 0.999922 | 0.999888 | 0.999800 |
| 0.80 | 0.999976 | 0.999946 | 0.999904 | 0.999850 | 0.999783 | 0.999615 |
| 1.00 | 0.999972 | 0.999937 | 0.999887 | 0.999824 | 0.999746 | 0.999548 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999919 | 0.999873 | 0.999817 | 0.999674 |
| 1.75 | 0.999987 | 0.999969 | 0.999946 | 0.999915 | 0.999878 | 0.999783 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999936 | 0.999885 |
| 2.50 | 1.000004 | 1.000008 | 1.000013 | 1.000021 | 1.000030 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000067 | 1.000096 | 1.000170 |
| 4.00 | 1.000021 | 1.000044 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000029 | 1.000063 | 1.000108 | 1.000168 | 1.000242 | 1.000429 |
| 8.00 | 1.000039 | 1.000071 | 1.000122 | 1.000189 | 1.000270 | 1.000475 |
| 10.00 | 1.000054 | 1.000084 | 1.000133 | 1.000201 | 1.000284 | 1.000498 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001083 | 1.001928 | 1.003017 | 1.006831 | 1.012251 | 1.019362 |
| 0.10 | 1.001014 | 1.001804 | 1.002824 | 1.006389 | 1.011446 | 1.018066 |
| 0.20 | 1.000818 | 1.001456 | 1.002277 | 1.005140 | 1.009178 | 1.014421 |
| 0.40 | 1.000192 | 1.000340 | 1.000527 | 1.001159 | 1.001992 | 1.002968 |
| 0.60 | 0.999549 | 0.999196 | 0.998739 | 0.997124 | 0.994790 | 0.991663 |
| 0.80 | 0.999133 | 0.998457 | 0.997587 | 0.994552 | 0.990268 | 0.984702 |
| 1.00 | 0.998984 | 0.998194 | 0.997178 | 0.993655 | 0.988733 | 0.982424 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994140 | 0.989634 | 0.983908 |
| 1.50 | 0.999267 | 0.998699 | 0.997970 | 0.995456 | 0.991978 | 0.987580 |
| 1.75 | 0.999511 | 0.999132 | 0.998647 | 0.996974 | 0.994668 | 0.991764 |
| 2.00 | 0.999743 | 0.999543 | 0.999288 | 0.998413 | 0.997214 | 0.995717 |
| 2.50 | 1.000118 | 1.000210 | 1.000329 | 1.000747 | 1.001343 | 1.002131 |
| 3.00 | 1.000382 | 1.000680 | 1.001063 | 1.002393 | 1.004260 | 1.006667 |
| 4.00 | 1.000699 | 1.001242 | 1.001940 | 1.004364 | 1.007757 | 1.012116 |
| 6.00 | 1.000963 | 1.001711 | 1.002674 | 1.006014 | 1.010688 | 1.016693 |
| 8.00 | 1.001064 | 1.001892 | 1.002955 | 1.006645 | 1.011811 | 1.018449 |
| 10.00 | 1.001114 | 1.001979 | 1.003089 | 1.006948 | 1.012349 | 1.019291 |

## TABLE II-A SHORT SOLENOID RATIOS

L = 0.208

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000030 | 1.000067 | 1.000120 | 1.000187 | 1.000270 | 1.000480 |
| 0.10 | 1.000028 | 1.000063 | 1.000112 | 1.000175 | 1.000253 | 1.000449 |
| 0.20 | 1.000023 | 1.000051 | 1.000091 | 1.000142 | 1.000204 | 1.000363 |
| 0.40 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000086 |
| 0.60 | 0.999988 | 0.999972 | 0.999950 | 0.999922 | 0.999888 | 0.999801 |
| 0.80 | 0.999976 | 0.999946 | 0.999904 | 0.999850 | 0.999784 | 0.999616 |
| 1.00 | 0.999972 | 0.999937 | 0.999887 | 0.999824 | 0.999746 | 0.999549 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999919 | 0.999873 | 0.999817 | 0.999674 |
| 1.75 | 0.999987 | 0.999969 | 0.999946 | 0.999915 | 0.999878 | 0.999782 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999936 | 0.999885 |
| 2.50 | 1.000004 | 1.000008 | 1.000013 | 1.000021 | 1.000029 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000067 | 1.000096 | 1.000170 |
| 4.00 | 1.000020 | 1.000045 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000031 | 1.000063 | 1.000109 | 1.000169 | 1.000242 | 1.000428 |
| 8.00 | 1.000038 | 1.000073 | 1.000122 | 1.000188 | 1.000269 | 1.000475 |
| 10.00 | 1.000053 | 1.000080 | 1.000133 | 1.000200 | 1.000284 | 1.000500 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001081 | 1.001924 | 1.003011 | 1.006817 | 1.012226 | 1.019321 |
| 0.10 | 1.001012 | 1.001801 | 1.002819 | 1.006377 | 1.011425 | 1.018031 |
| 0.20 | 1.000817 | 1.001454 | 1.002274 | 1.005133 | 1.009167 | 1.014404 |
| 0.40 | 1.000193 | 1.000342 | 1.000530 | 1.001166 | 1.002005 | 1.002990 |
| 0.60 | 0.999551 | 0.999199 | 0.998744 | 0.997136 | 0.994812 | 0.991698 |
| 0.80 | 0.999135 | 0.998460 | 0.997591 | 0.994561 | 0.990284 | 0.984727 |
| 1.00 | 0.998984 | 0.998195 | 0.997180 | 0.993660 | 0.988741 | 0.982435 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994140 | 0.989634 | 0.983907 |
| 1.50 | 0.999267 | 0.998698 | 0.997969 | 0.995454 | 0.991974 | 0.987574 |
| 1.75 | 0.999511 | 0.999132 | 0.998646 | 0.996972 | 0.994664 | 0.991758 |
| 2.00 | 0.999742 | 0.999543 | 0.999287 | 0.998411 | 0.997210 | 0.995711 |
| 2.50 | 1.000118 | 1.000210 | 1.000328 | 1.000745 | 1.001341 | 1.002126 |
| 3.00 | 1.000382 | 1.000680 | 1.001062 | 1.002392 | 1.004258 | 1.006664 |
| 4.00 | 1.000699 | 1.001242 | 1.001940 | 1.004364 | 1.007756 | 1.012114 |
| 6.00 | 1.000963 | 1.001711 | 1.002674 | 1.006014 | 1.010688 | 1.016693 |
| 8.00 | 1.001065 | 1.001892 | 1.002954 | 1.006645 | 1.011810 | 1.018449 |
| 10.00 | 1.001115 | 1.001978 | 1.003089 | 1.006948 | 1.012349 | 1.019291 |

## TABLE II-A SHORT SOLENOID RATIOS

L = 0.210

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000030 | 1.000067 | 1.000120 | 1.000187 | 1.000269 | 1.000479 |
| 0.10 | 1.000028 | 1.000063 | 1.000112 | 1.000175 | 1.000252 | 1.000448 |
| 0.20 | 1.000023 | 1.000051 | 1.000091 | 1.000142 | 1.000204 | 1.000363 |
| 0.40 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 0.60 | 0.999988 | 0.999972 | 0.999951 | 0.999923 | 0.999889 | 0.999802 |
| 0.80 | 0.999976 | 0.999946 | 0.999904 | 0.999850 | 0.999784 | 0.999616 |
| 1.00 | 0.999972 | 0.999937 | 0.999887 | 0.999824 | 0.999746 | 0.999549 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999918 | 0.999873 | 0.999817 | 0.999674 |
| 1.75 | 0.999987 | 0.999969 | 0.999946 | 0.999915 | 0.999877 | 0.999782 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999935 | 0.999885 |
| 2.50 | 1.000004 | 1.000008 | 1.000013 | 1.000020 | 1.000029 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000067 | 1.000096 | 1.000170 |
| 4.00 | 1.000020 | 1.000044 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000030 | 1.000063 | 1.000109 | 1.000169 | 1.000242 | 1.000429 |
| 8.00 | 1.000040 | 1.000074 | 1.000122 | 1.000189 | 1.000269 | 1.000475 |
| 10.00 | 1.000053 | 1.000084 | 1.000130 | 1.000201 | 1.000283 | 1.000499 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001078 | 1.001920 | 1.003005 | 1.006803 | 1.012200 | 1.019279 |
| 0.10 | 1.001010 | 1.001798 | 1.002813 | 1.006365 | 1.011403 | 1.017996 |
| 0.20 | 1.000816 | 1.001452 | 1.002272 | 1.005127 | 1.009156 | 1.014387 |
| 0.40 | 1.000194 | 1.000344 | 1.000533 | 1.001174 | 1.002018 | 1.003012 |
| 0.60 | 0.999553 | 0.999203 | 0.998750 | 0.997148 | 0.994834 | 0.991732 |
| 0.80 | 0.999136 | 0.998463 | 0.997596 | 0.994571 | 0.990300 | 0.984752 |
| 1.00 | 0.998985 | 0.998196 | 0.997182 | 0.993664 | 0.988748 | 0.982446 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994140 | 0.989633 | 0.983907 |
| 1.50 | 0.999267 | 0.998698 | 0.997968 | 0.995452 | 0.991971 | 0.987569 |
| 1.75 | 0.999510 | 0.999131 | 0.998644 | 0.996969 | 0.994660 | 0.991751 |
| 2.00 | 0.999742 | 0.999542 | 0.999286 | 0.998408 | 0.997206 | 0.995705 |
| 2.50 | 1.000117 | 1.000209 | 1.000328 | 1.000744 | 1.001338 | 1.002122 |
| 3.00 | 1.000382 | 1.000679 | 1.001062 | 1.002391 | 1.004257 | 1.006662 |
| 4.00 | 1.000699 | 1.001242 | 1.001940 | 1.004364 | 1.007755 | 1.012113 |
| 6.00 | 1.000963 | 1.001711 | 1.002674 | 1.006014 | 1.010687 | 1.016692 |
| 8.00 | 1.001064 | 1.001891 | 1.002954 | 1.006645 | 1.011810 | 1.018449 |
| 10.00 | 1.001114 | 1.001978 | 1.003089 | 1.006948 | 1.012349 | 1.019291 |

## TABLE II-A SHORT SOLENOID RATIOS

L = 0.212

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000030 | 1.000067 | 1.000119 | 1.000187 | 1.000269 | 1.000478 |
| 0.10 | 1.000028 | 1.000063 | 1.000112 | 1.000175 | 1.000252 | 1.000448 |
| 0.20 | 1.000023 | 1.000051 | 1.000091 | 1.000141 | 1.000204 | 1.000362 |
| 0.40 | 1.000005 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000087 |
| 0.60 | 0.999988 | 0.999972 | 0.999951 | 0.999923 | 0.999889 | 0.999803 |
| 0.80 | 0.999976 | 0.999946 | 0.999904 | 0.999850 | 0.999785 | 0.999617 |
| 1.00 | 0.999972 | 0.999937 | 0.999887 | 0.999824 | 0.999746 | 0.999549 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999918 | 0.999873 | 0.999816 | 0.999674 |
| 1.75 | 0.999986 | 0.999969 | 0.999946 | 0.999915 | 0.999877 | 0.999782 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999935 | 0.999885 |
| 2.50 | 1.000004 | 1.000007 | 1.000013 | 1.000020 | 1.000029 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000067 | 1.000096 | 1.000170 |
| 4.00 | 1.000020 | 1.000045 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000030 | 1.000063 | 1.000109 | 1.000169 | 1.000242 | 1.000428 |
| 8.00 | 1.000036 | 1.000072 | 1.000124 | 1.000189 | 1.000269 | 1.000475 |
| 10.00 | 1.000045 | 1.000074 | 1.000132 | 1.000200 | 1.000284 | 1.000499 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001076 | 1.001916 | 1.002999 | 1.006789 | 1.012174 | 1.019237 |
| 0.10 | 1.001008 | 1.001794 | 1.002808 | 1.006353 | 1.011381 | 1.017961 |
| 0.20 | 1.000815 | 1.001451 | 1.002269 | 1.005121 | 1.009145 | 1.014370 |
| 0.40 | 1.000195 | 1.000346 | 1.000537 | 1.001181 | 1.002032 | 1.003034 |
| 0.60 | 0.999555 | 0.999206 | 0.998755 | 0.997161 | 0.994856 | 0.991768 |
| 0.80 | 0.999138 | 0.998465 | 0.997600 | 0.994580 | 0.990317 | 0.984778 |
| 1.00 | 0.998986 | 0.998197 | 0.997184 | 0.993668 | 0.988755 | 0.982457 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994140 | 0.989633 | 0.983906 |
| 1.50 | 0.999266 | 0.998697 | 0.997967 | 0.995450 | 0.991967 | 0.987563 |
| 1.75 | 0.999510 | 0.999130 | 0.998643 | 0.996967 | 0.994655 | 0.991744 |
| 2.00 | 0.999742 | 0.999541 | 0.999285 | 0.998406 | 0.997202 | 0.995699 |
| 2.50 | 1.000117 | 1.000209 | 1.000327 | 1.000742 | 1.001335 | 1.002118 |
| 3.00 | 1.000382 | 1.000679 | 1.001061 | 1.002390 | 1.004255 | 1.006659 |
| 4.00 | 1.000698 | 1.001242 | 1.001940 | 1.004363 | 1.007755 | 1.012112 |
| 6.00 | 1.000963 | 1.001711 | 1.002674 | 1.006014 | 1.010687 | 1.016692 |
| 8.00 | 1.001064 | 1.001891 | 1.002954 | 1.006645 | 1.011810 | 1.018448 |
| 10.00 | 1.001113 | 1.001978 | 1.003090 | 1.006947 | 1.012349 | 1.019290 |

## TABLE II-A SHORT SOLENOID RATIOS

L = 0.214

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000030 | 1.000067 | 1.000119 | 1.000186 | 1.000268 | 1.000477 |
| 0.10 | 1.000028 | 1.000063 | 1.000112 | 1.000174 | 1.000251 | 1.000447 |
| 0.20 | 1.000023 | 1.000051 | 1.000090 | 1.000141 | 1.000203 | 1.000362 |
| 0.40 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000049 | 1.000088 |
| 0.60 | 0.999988 | 0.999972 | 0.999951 | 0.999923 | 0.999890 | 0.999804 |
| 0.80 | 0.999976 | 0.999946 | 0.999904 | 0.999851 | 0.999785 | 0.999618 |
| 1.00 | 0.999972 | 0.999937 | 0.999887 | 0.999824 | 0.999747 | 0.999550 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999918 | 0.999872 | 0.999816 | 0.999674 |
| 1.75 | 0.999987 | 0.999969 | 0.999945 | 0.999915 | 0.999877 | 0.999782 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999935 | 0.999885 |
| 2.50 | 1.000004 | 1.000008 | 1.000013 | 1.000020 | 1.000029 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000067 | 1.000096 | 1.000170 |
| 4.00 | 1.000021 | 1.000044 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000031 | 1.000063 | 1.000108 | 1.000169 | 1.000242 | 1.000429 |
| 8.00 | 1.000037 | 1.000075 | 1.000122 | 1.000188 | 1.000268 | 1.000475 |
| 10.00 | 1.000048 | 1.000083 | 1.000131 | 1.000200 | 1.000285 | 1.000497 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001074 | 1.001912 | 1.002993 | 1.006774 | 1.012148 | 1.019195 |
| 0.10 | 1.001006 | 1.001791 | 1.002803 | 1.006341 | 1.011359 | 1.017926 |
| 0.20 | 1.000814 | 1.001449 | 1.002266 | 1.005115 | 1.009134 | 1.014353 |
| 0.40 | 1.000196 | 1.000348 | 1.000540 | 1.001188 | 1.002045 | 1.003056 |
| 0.60 | 0.999557 | 0.999210 | 0.998761 | 0.997173 | 0.994878 | 0.991803 |
| 0.80 | 0.999139 | 0.998468 | 0.997604 | 0.994589 | 0.990333 | 0.984803 |
| 1.00 | 0.998987 | 0.998199 | 0.997186 | 0.993672 | 0.988763 | 0.982468 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994140 | 0.989633 | 0.983905 |
| 1.50 | 0.999266 | 0.998697 | 0.997967 | 0.995448 | 0.991964 | 0.987558 |
| 1.75 | 0.999510 | 0.999130 | 0.998642 | 0.996964 | 0.994651 | 0.991738 |
| 2.00 | 0.999741 | 0.999541 | 0.999284 | 0.998404 | 0.997198 | 0.995692 |
| 2.50 | 1.000117 | 1.000208 | 1.000326 | 1.000741 | 1.001333 | 1.002114 |
| 3.00 | 1.000382 | 1.000679 | 1.001061 | 1.002389 | 1.004253 | 1.006656 |
| 4.00 | 1.000698 | 1.001241 | 1.001940 | 1.004363 | 1.007754 | 1.012111 |
| 6.00 | 1.000963 | 1.001711 | 1.002674 | 1.006013 | 1.010687 | 1.016692 |
| 8.00 | 1.001065 | 1.001892 | 1.002954 | 1.006645 | 1.011810 | 1.018448 |
| 10.00 | 1.001113 | 1.001979 | 1.003089 | 1.006948 | 1.012349 | 1.019291 |

# TABLE II-A SHORT SOLENOID RATIOS

L = 0.216

| T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.000030 | 1.000067 | 1.000119 | 1.000186 | 1.000268 | 1.000476 |
| 0.10 | 1.000028 | 1.000063 | 1.000111 | 1.000174 | 1.000251 | 1.000446 |
| 0.20 | 1.000023 | 1.000051 | 1.000090 | 1.000141 | 1.000203 | 1.000361 |
| 0.40 | 1.000006 | 1.000012 | 1.000022 | 1.000034 | 1.000050 | 1.000088 |
| 0.60 | 0.999988 | 0.999973 | 0.999951 | 0.999924 | 0.999890 | 0.999804 |
| 0.80 | 0.999976 | 0.999946 | 0.999905 | 0.999851 | 0.999785 | 0.999618 |
| 1.00 | 0.999972 | 0.999937 | 0.999887 | 0.999824 | 0.999747 | 0.999550 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999918 | 0.999872 | 0.999816 | 0.999673 |
| 1.75 | 0.999986 | 0.999969 | 0.999945 | 0.999915 | 0.999877 | 0.999782 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999935 | 0.999885 |
| 2.50 | 1.000004 | 1.000007 | 1.000013 | 1.000020 | 1.000029 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000066 | 1.000096 | 1.000170 |
| 4.00 | 1.000021 | 1.000045 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000032 | 1.000062 | 1.000109 | 1.000168 | 1.000242 | 1.000429 |
| 8.00 | 1.000041 | 1.000073 | 1.000123 | 1.000189 | 1.000270 | 1.000475 |
| 10.00 | 1.000051 | 1.000084 | 1.000132 | 1.000198 | 1.000282 | 1.000499 |

| T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 0.00 | 1.001072 | 1.001908 | 1.002986 | 1.006760 | 1.012121 | 1.019152 |
| 0.10 | 1.001004 | 1.001788 | 1.002798 | 1.006329 | 1.011337 | 1.017891 |
| 0.20 | 1.000813 | 1.001447 | 1.002263 | 1.005109 | 1.009122 | 1.014335 |
| 0.40 | 1.000198 | 1.000350 | 1.000543 | 1.001196 | 1.002059 | 1.003079 |
| 0.60 | 0.999559 | 0.999213 | 0.998766 | 0.997185 | 0.994901 | 0.991839 |
| 0.80 | 0.999141 | 0.998471 | 0.997608 | 0.994599 | 0.990350 | 0.984829 |
| 1.00 | 0.998987 | 0.998200 | 0.997188 | 0.993677 | 0.988770 | 0.982480 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994139 | 0.989632 | 0.983905 |
| 1.50 | 0.999266 | 0.998696 | 0.997966 | 0.995446 | 0.991960 | 0.987552 |
| 1.75 | 0.999509 | 0.999129 | 0.998641 | 0.996962 | 0.994647 | 0.991731 |
| 2.00 | 0.999741 | 0.999540 | 0.999283 | 0.998402 | 0.997194 | 0.995686 |
| 2.50 | 1.000117 | 1.000208 | 1.000326 | 1.000739 | 1.001330 | 1.002110 |
| 3.00 | 1.000382 | 1.000679 | 1.001061 | 1.002388 | 1.004251 | 1.006654 |
| 4.00 | 1.000698 | 1.001241 | 1.001939 | 1.004362 | 1.007753 | 1.012110 |
| 6.00 | 1.000963 | 1.001711 | 1.002674 | 1.006013 | 1.010687 | 1.016691 |
| 8.00 | 1.001065 | 1.001891 | 1.002955 | 1.006645 | 1.011810 | 1.018448 |
| 10.00 | 1.001114 | 1.001978 | 1.003089 | 1.006948 | 1.012349 | 1.019290 |

TABLE II-A SHORT SOLENOID RATIOS

L = 0.218

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000030 | 1.000067 | 1.000119 | 1.000185 | 1.000267 | 1.000475 |
| 0.10 | 1.000028 | 1.000063 | 1.000111 | 1.000174 | 1.000250 | 1.000445 |
| 0.20 | 1.000023 | 1.000051 | 1.000090 | 1.000141 | 1.000203 | 1.000361 |
| 0.40 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 0.60 | 0.999988 | 0.999973 | 0.999951 | 0.999924 | 0.999891 | 0.999805 |
| 0.80 | 0.999976 | 0.999946 | 0.999905 | 0.999851 | 0.999786 | 0.999619 |
| 1.00 | 0.999972 | 0.999937 | 0.999888 | 0.999824 | 0.999747 | 0.999550 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999918 | 0.999872 | 0.999816 | 0.999673 |
| 1.75 | 0.999986 | 0.999969 | 0.999945 | 0.999915 | 0.999877 | 0.999782 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999935 | 0.999885 |
| 2.50 | 1.000003 | 1.000008 | 1.000013 | 1.000020 | 1.000029 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000066 | 1.000096 | 1.000170 |
| 4.00 | 1.000020 | 1.000044 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000030 | 1.000062 | 1.000109 | 1.000168 | 1.000242 | 1.000429 |
| 8.00 | 1.000037 | 1.000071 | 1.000123 | 1.000187 | 1.000268 | 1.000475 |
| 10.00 | 1.000047 | 1.000079 | 1.000130 | 1.000198 | 1.000281 | 1.000497 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001069 | 1.001904 | 1.002980 | 1.006745 | 1.012095 | 1.019109 |
| 0.10 | 1.001002 | 1.001784 | 1.002792 | 1.006316 | 1.011315 | 1.017855 |
| 0.20 | 1.000812 | 1.001445 | 1.002260 | 1.005102 | 1.009111 | 1.014317 |
| 0.40 | 1.000199 | 1.000352 | 1.000546 | 1.001203 | 1.002073 | 1.003101 |
| 0.60 | 0.999561 | 0.999217 | 0.998772 | 0.997198 | 0.994923 | 0.991874 |
| 0.80 | 0.999142 | 0.998474 | 0.997612 | 0.994608 | 0.990367 | 0.984855 |
| 1.00 | 0.998988 | 0.998201 | 0.997190 | 0.993681 | 0.988778 | 0.982491 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994139 | 0.989632 | 0.983904 |
| 1.50 | 0.999265 | 0.998696 | 0.997965 | 0.995444 | 0.991957 | 0.987546 |
| 1.75 | 0.999509 | 0.999128 | 0.998640 | 0.996960 | 0.994642 | 0.991724 |
| 2.00 | 0.999740 | 0.999539 | 0.999282 | 0.998399 | 0.997190 | 0.995680 |
| 2.50 | 1.000116 | 1.000207 | 1.000325 | 1.000738 | 1.001327 | 1.002105 |
| 3.00 | 1.000382 | 1.000678 | 1.001060 | 1.002387 | 1.004250 | 1.006651 |
| 4.00 | 1.000698 | 1.001241 | 1.001939 | 1.004362 | 1.007753 | 1.012109 |
| 6.00 | 1.000963 | 1.001712 | 1.002674 | 1.006013 | 1.010687 | 1.016691 |
| 8.00 | 1.001065 | 1.001892 | 1.002954 | 1.006645 | 1.011810 | 1.018448 |
| 10.00 | 1.001115 | 1.001978 | 1.003089 | 1.006948 | 1.012349 | 1.019290 |

# TABLE II-A SHORT SOLENOID RATIOS

L = 0.220

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000030 | 1.000067 | 1.000118 | 1.000185 | 1.000266 | 1.000474 |
| 0.10 | 1.000028 | 1.000062 | 1.000111 | 1.000173 | 1.000250 | 1.000444 |
| 0.20 | 1.000023 | 1.000051 | 1.000090 | 1.000141 | 1.000203 | 1.000360 |
| 0.40 | 1.000006 | 1.000013 | 1.000022 | 1.000035 | 1.000050 | 1.000089 |
| 0.60 | 0.999988 | 0.999973 | 0.999952 | 0.999924 | 0.999891 | 0.999806 |
| 0.80 | 0.999976 | 0.999947 | 0.999905 | 0.999851 | 0.999786 | 0.999620 |
| 1.00 | 0.999972 | 0.999937 | 0.999888 | 0.999824 | 0.999747 | 0.999551 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999980 | 0.999954 | 0.999918 | 0.999872 | 0.999816 | 0.999673 |
| 1.75 | 0.999986 | 0.999969 | 0.999945 | 0.999915 | 0.999877 | 0.999781 |
| 2.00 | 0.999993 | 0.999984 | 0.999971 | 0.999955 | 0.999935 | 0.999884 |
| 2.50 | 1.000004 | 1.000007 | 1.000013 | 1.000020 | 1.000029 | 1.000052 |
| 3.00 | 1.000011 | 1.000024 | 1.000043 | 1.000066 | 1.000095 | 1.000170 |
| 4.00 | 1.000021 | 1.000044 | 1.000078 | 1.000122 | 1.000175 | 1.000311 |
| 6.00 | 1.000031 | 1.000062 | 1.000108 | 1.000168 | 1.000242 | 1.000429 |
| 8.00 | 1.000038 | 1.000072 | 1.000122 | 1.000188 | 1.000270 | 1.000475 |
| 10.00 | 1.000050 | 1.000083 | 1.000132 | 1.000197 | 1.000284 | 1.000498 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001067 | 1.001900 | 1.002974 | 1.006731 | 1.012068 | 1.019066 |
| 0.10 | 1.001000 | 1.001781 | 1.002787 | 1.006304 | 1.011293 | 1.017819 |
| 0.20 | 1.000811 | 1.001444 | 1.002258 | 1.005096 | 1.009100 | 1.014299 |
| 0.40 | 1.000200 | 1.000354 | 1.000549 | 1.001210 | 1.002086 | 1.003123 |
| 0.60 | 0.999563 | 0.999221 | 0.998777 | 0.997211 | 0.994946 | 0.991911 |
| 0.80 | 0.999144 | 0.998476 | 0.997617 | 0.994618 | 0.990384 | 0.984882 |
| 1.00 | 0.998989 | 0.998202 | 0.997192 | 0.993686 | 0.988786 | 0.982503 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994139 | 0.989632 | 0.983903 |
| 1.50 | 0.999265 | 0.998695 | 0.997964 | 0.995442 | 0.991953 | 0.987540 |
| 1.75 | 0.999508 | 0.999127 | 0.998639 | 0.996957 | 0.994638 | 0.991717 |
| 2.00 | 0.999740 | 0.999539 | 0.999281 | 0.998397 | 0.997186 | 0.995674 |
| 2.50 | 1.000116 | 1.000207 | 1.000324 | 1.000736 | 1.001324 | 1.002101 |
| 3.00 | 1.000381 | 1.000678 | 1.001060 | 1.002386 | 1.004248 | 1.006648 |
| 4.00 | 1.000698 | 1.001241 | 1.001939 | 1.004362 | 1.007752 | 1.012108 |
| 6.00 | 1.000963 | 1.001711 | 1.002673 | 1.006013 | 1.010687 | 1.016691 |
| 8.00 | 1.001065 | 1.001891 | 1.002955 | 1.006645 | 1.011810 | 1.018448 |
| 10.00 | 1.001115 | 1.001979 | 1.003088 | 1.006948 | 1.012348 | 1.019290 |

# TABLE II-A SHORT SOLENOID RATIOS

L = 0.250

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000029 | 1.000064 | 1.000114 | 1.000179 | 1.000258 | 1.000458 |
| 0.10 | 1.000027 | 1.000061 | 1.000108 | 1.000168 | 1.000242 | 1.000431 |
| 0.20 | 1.000022 | 1.000050 | 1.000088 | 1.000138 | 1.000199 | 1.000353 |
| 0.40 | 1.000006 | 1.000014 | 1.000024 | 1.000038 | 1.000055 | 1.000097 |
| 0.60 | 0.999989 | 0.999975 | 0.999955 | 0.999930 | 0.999899 | 0.999820 |
| 0.80 | 0.999977 | 0.999948 | 0.999908 | 0.999856 | 0.999792 | 0.999631 |
| 1.00 | 0.999972 | 0.999938 | 0.999889 | 0.999827 | 0.999750 | 0.999556 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999979 | 0.999954 | 0.999918 | 0.999871 | 0.999815 | 0.999671 |
| 1.75 | 0.999986 | 0.999969 | 0.999945 | 0.999913 | 0.999875 | 0.999778 |
| 2.00 | 0.999993 | 0.999983 | 0.999970 | 0.999954 | 0.999933 | 0.999882 |
| 2.50 | 1.000003 | 1.000007 | 1.000013 | 1.000020 | 1.000028 | 1.000050 |
| 3.00 | 1.000011 | 1.000024 | 1.000042 | 1.000066 | 1.000095 | 1.000168 |
| 4.00 | 1.000020 | 1.000044 | 1.000078 | 1.000121 | 1.000175 | 1.000310 |
| 6.00 | 1.000030 | 1.000063 | 1.000109 | 1.000168 | 1.000241 | 1.000428 |
| 8.00 | 1.000040 | 1.000071 | 1.000122 | 1.000188 | 1.000268 | 1.000474 |
| 10.00 | 1.000047 | 1.000079 | 1.000131 | 1.000199 | 1.000283 | 1.000498 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.001031 | 1.001836 | 1.002873 | 1.006501 | 1.011650 | 1.018390 |
| 0.10 | 1.000970 | 1.001727 | 1.002702 | 1.006109 | 1.010939 | 1.017250 |
| 0.20 | 1.000795 | 1.001414 | 1.002212 | 1.004993 | 1.008916 | 1.014010 |
| 0.40 | 1.000217 | 1.000385 | 1.000598 | 1.001324 | 1.002297 | 1.003471 |
| 0.60 | 0.999595 | 0.999277 | 0.998866 | 0.997413 | 0.995309 | 0.992485 |
| 0.80 | 0.999169 | 0.998521 | 0.997686 | 0.994774 | 0.990659 | 0.985306 |
| 1.00 | 0.999001 | 0.998224 | 0.997225 | 0.993759 | 0.988912 | 0.982694 |
| 1.25 | 0.999057 | 0.998326 | 0.997386 | 0.994138 | 0.989629 | 0.983895 |
| 1.50 | 0.999260 | 0.998686 | 0.997949 | 0.995409 | 0.991895 | 0.987449 |
| 1.75 | 0.999502 | 0.999116 | 0.998621 | 0.996917 | 0.994567 | 0.991607 |
| 2.00 | 0.999734 | 0.999528 | 0.999265 | 0.998360 | 0.997120 | 0.995572 |
| 2.50 | 1.000112 | 1.000200 | 1.000313 | 1.000711 | 1.001279 | 1.002031 |
| 3.00 | 1.000379 | 1.000673 | 1.001053 | 1.002370 | 1.004220 | 1.006604 |
| 4.00 | 1.000697 | 1.001239 | 1.001936 | 1.004355 | 1.007740 | 1.012089 |
| 6.00 | 1.000963 | 1.001711 | 1.002673 | 1.006012 | 1.010684 | 1.016687 |
| 8.00 | 1.001064 | 1.001891 | 1.002954 | 1.006644 | 1.011809 | 1.018447 |
| 10.00 | 1.001114 | 1.001978 | 1.003089 | 1.006947 | 1.012348 | 1.019290 |

# TABLE II-A SHORT SOLENOID RATIOS

L = 0.300

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000027 | 1.000060 | 1.000107 | 1.000168 | 1.000241 | 1.000429 |
| 0.10 | 1.000025 | 1.000057 | 1.000101 | 1.000158 | 1.000228 | 1.000406 |
| 0.20 | 1.000021 | 1.000048 | 1.000085 | 1.000132 | 1.000191 | 1.000339 |
| 0.40 | 1.000007 | 1.000016 | 1.000028 | 1.000043 | 1.000062 | 1.000110 |
| 0.60 | 0.999990 | 0.999978 | 0.999962 | 0.999940 | 0.999914 | 0.999847 |
| 0.80 | 0.999978 | 0.999951 | 0.999913 | 0.999864 | 0.999805 | 0.999653 |
| 1.00 | 0.999973 | 0.999939 | 0.999892 | 0.999831 | 0.999756 | 0.999567 |
| 1.25 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999581 |
| 1.50 | 0.999979 | 0.999953 | 0.999917 | 0.999870 | 0.999812 | 0.999667 |
| 1.75 | 0.999986 | 0.999968 | 0.999943 | 0.999911 | 0.999872 | 0.999773 |
| 2.00 | 0.999992 | 0.999983 | 0.999969 | 0.999952 | 0.999931 | 0.999877 |
| 2.50 | 1.000003 | 1.000007 | 1.000012 | 1.000018 | 1.000026 | 1.000046 |
| 3.00 | 1.000011 | 1.000024 | 1.000042 | 1.000065 | 1.000094 | 1.000166 |
| 4.00 | 1.000020 | 1.000044 | 1.000078 | 1.000121 | 1.000174 | 1.000309 |
| 6.00 | 1.000030 | 1.000062 | 1.000108 | 1.000168 | 1.000241 | 1.000428 |
| 8.00 | 1.000035 | 1.000071 | 1.000122 | 1.000188 | 1.000268 | 1.000474 |
| 10.00 | 1.000044 | 1.000080 | 1.000129 | 1.000198 | 1.000282 | 1.000496 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000966 | 1.001719 | 1.002690 | 1.006081 | 1.010886 | 1.017159 |
| 0.10 | 1.000914 | 1.001626 | 1.002544 | 1.005750 | 1.010287 | 1.016204 |
| 0.20 | 1.000763 | 1.001358 | 1.002124 | 1.004794 | 1.008559 | 1.013447 |
| 0.40 | 1.000247 | 1.000439 | 1.000683 | 1.001520 | 1.002660 | 1.004068 |
| 0.60 | 0.999654 | 0.999383 | 0.999032 | 0.997789 | 0.995986 | 0.993559 |
| 0.80 | 0.999218 | 0.998608 | 0.997822 | 0.995077 | 0.991195 | 0.986137 |
| 1.00 | 0.999025 | 0.998267 | 0.997292 | 0.993907 | 0.989170 | 0.983084 |
| 1.25 | 0.999058 | 0.998327 | 0.997388 | 0.994142 | 0.989631 | 0.983892 |
| 1.50 | 0.999250 | 0.998669 | 0.997923 | 0.995348 | 0.991786 | 0.987277 |
| 1.75 | 0.999490 | 0.999094 | 0.998587 | 0.996840 | 0.994431 | 0.991395 |
| 2.00 | 0.999722 | 0.999508 | 0.999232 | 0.998288 | 0.996993 | 0.995374 |
| 2.50 | 1.000104 | 1.000186 | 1.000291 | 1.000661 | 1.001192 | 1.001895 |
| 3.00 | 1.000374 | 1.000665 | 1.001039 | 1.002339 | 1.004164 | 1.006518 |
| 4.00 | 1.000695 | 1.001235 | 1.001930 | 1.004342 | 1.007717 | 1.012054 |
| 6.00 | 1.000962 | 1.001710 | 1.002671 | 1.006009 | 1.010678 | 1.016678 |
| 8.00 | 1.001064 | 1.001891 | 1.002953 | 1.006643 | 1.011807 | 1.018443 |
| 10.00 | 1.001113 | 1.001978 | 1.003089 | 1.006947 | 1.012347 | 1.019288 |

TABLE II-A SHORT SOLENOID RATIOS

L = 0.350

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000025 | 1.000056 | 1.000099 | 1.000155 | 1.000224 | 1.000398 |
| 0.10 | 1.000024 | 1.000053 | 1.000095 | 1.000148 | 1.000213 | 1.000379 |
| 0.20 | 1.000020 | 1.000045 | 1.000081 | 1.000126 | 1.000182 | 1.000323 |
| 0.40 | 1.000008 | 1.000017 | 1.000031 | 1.000048 | 1.000069 | 1.000123 |
| 0.60 | 0.999992 | 0.999983 | 0.999969 | 0.999952 | 0.999930 | 0.999876 |
| 0.80 | 0.999980 | 0.999955 | 0.999920 | 0.999874 | 0.999819 | 0.999678 |
| 1.00 | 0.999974 | 0.999941 | 0.999895 | 0.999836 | 0.999764 | 0.999580 |
| 1.25 | 0.999974 | 0.999941 | 0.999896 | 0.999837 | 0.999765 | 0.999582 |
| 1.50 | 0.999979 | 0.999952 | 0.999915 | 0.999868 | 0.999810 | 0.999662 |
| 1.75 | 0.999985 | 0.999967 | 0.999942 | 0.999909 | 0.999869 | 0.999767 |
| 2.00 | 0.999992 | 0.999982 | 0.999968 | 0.999949 | 0.999927 | 0.999870 |
| 2.50 | 1.000003 | 1.000006 | 1.000011 | 1.000016 | 1.000024 | 1.000042 |
| 3.00 | 1.000011 | 1.000023 | 1.000041 | 1.000064 | 1.000092 | 1.000163 |
| 4.00 | 1.000020 | 1.000044 | 1.000077 | 1.000121 | 1.000173 | 1.000308 |
| 6.00 | 1.000029 | 1.000061 | 1.000108 | 1.000168 | 1.000241 | 1.000428 |
| 8.00 | 1.000036 | 1.000070 | 1.000121 | 1.000187 | 1.000268 | 1.000474 |
| 10.00 | 1.000042 | 1.000074 | 1.000129 | 1.000197 | 1.000281 | 1.000496 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000895 | 1.001593 | 1.002492 | 1.005629 | 1.010063 | 1.015838 |
| 0.10 | 1.000852 | 1.001516 | 1.002372 | 1.005357 | 1.009575 | 1.015064 |
| 0.20 | 1.000727 | 1.001293 | 1.002022 | 1.004562 | 1.008144 | 1.012792 |
| 0.40 | 1.000277 | 1.000491 | 1.000766 | 1.001712 | 1.003015 | 1.004652 |
| 0.60 | 0.999720 | 0.999500 | 0.999215 | 0.998205 | 0.996735 | 0.994749 |
| 0.80 | 0.999275 | 0.998710 | 0.997981 | 0.995435 | 0.991827 | 0.987119 |
| 1.00 | 0.999056 | 0.998321 | 0.997376 | 0.994093 | 0.989493 | 0.983574 |
| 1.25 | 0.999061 | 0.998331 | 0.997395 | 0.994155 | 0.989650 | 0.983913 |
| 1.50 | 0.999240 | 0.998650 | 0.997893 | 0.995280 | 0.991664 | 0.987085 |
| 1.75 | 0.999475 | 0.999069 | 0.998547 | 0.996751 | 0.994273 | 0.991149 |
| 2.00 | 0.999709 | 0.999483 | 0.999195 | 0.998203 | 0.996842 | 0.995140 |
| 2.50 | 1.000095 | 1.000169 | 1.000265 | 1.000602 | 1.001088 | 1.001734 |
| 3.00 | 1.000368 | 1.000654 | 1.001022 | 1.002302 | 1.004098 | 1.006415 |
| 4.00 | 1.000693 | 1.001231 | 1.001923 | 1.004327 | 1.007690 | 1.012011 |
| 6.00 | 1.000961 | 1.001709 | 1.002670 | 1.006005 | 1.010672 | 1.016668 |
| 8.00 | 1.001064 | 1.001890 | 1.002953 | 1.006642 | 1.011805 | 1.018440 |
| 10.00 | 1.001113 | 1.001977 | 1.003088 | 1.006946 | 1.012346 | 1.019287 |

TABLE II-A SHORT SOLENOID RATIOS

L = 0.400

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000023 | 1.000051 | 1.000091 | 1.000142 | 1.000205 | 1.000365 |
| 0.10 | 1.000022 | 1.000049 | 1.000087 | 1.000137 | 1.000197 | 1.000350 |
| 0.20 | 1.000019 | 1.000043 | 1.000076 | 1.000119 | 1.000171 | 1.000305 |
| 0.40 | 1.000008 | 1.000019 | 1.000034 | 1.000053 | 1.000076 | 1.000135 |
| 0.60 | 0.999994 | 0.999987 | 0.999977 | 0.999964 | 0.999948 | 0.999907 |
| 0.80 | 0.999982 | 0.999959 | 0.999927 | 0.999886 | 0.999835 | 0.999707 |
| 1.00 | 0.999975 | 0.999943 | 0.999899 | 0.999842 | 0.999773 | 0.999597 |
| 1.25 | 0.999974 | 0.999942 | 0.999896 | 0.999838 | 0.999766 | 0.999585 |
| 1.50 | 0.999979 | 0.999952 | 0.999914 | 0.999866 | 0.999807 | 0.999657 |
| 1.75 | 0.999985 | 0.999966 | 0.999940 | 0.999906 | 0.999865 | 0.999759 |
| 2.00 | 0.999992 | 0.999981 | 0.999966 | 0.999947 | 0.999923 | 0.999863 |
| 2.50 | 1.000002 | 1.000005 | 1.000009 | 1.000015 | 1.000021 | 1.000037 |
| 3.00 | 1.000010 | 1.000023 | 1.000040 | 1.000063 | 1.000090 | 1.000160 |
| 4.00 | 1.000020 | 1.000044 | 1.000077 | 1.000120 | 1.000173 | 1.000307 |
| 6.00 | 1.000029 | 1.000062 | 1.000108 | 1.000168 | 1.000241 | 1.000427 |
| 8.00 | 1.000033 | 1.000070 | 1.000122 | 1.000186 | 1.000267 | 1.000474 |
| 10.00 | 1.000042 | 1.000074 | 1.000126 | 1.000196 | 1.000281 | 1.000496 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000821 | 1.001461 | 1.002285 | 1.005157 | 1.009209 | 1.014471 |
| 0.10 | 1.000787 | 1.001400 | 1.002190 | 1.004943 | 1.008825 | 1.013865 |
| 0.20 | 1.000686 | 1.001220 | 1.001908 | 1.004303 | 1.007679 | 1.012055 |
| 0.40 | 1.000303 | 1.000538 | 1.000841 | 1.001885 | 1.003336 | 1.005182 |
| 0.60 | 0.999789 | 0.999624 | 0.999409 | 0.998645 | 0.997530 | 0.996015 |
| 0.80 | 0.999340 | 0.998826 | 0.998162 | 0.995842 | 0.992551 | 0.988245 |
| 1.00 | 0.999092 | 0.998386 | 0.997478 | 0.994319 | 0.989888 | 0.984176 |
| 1.25 | 0.999066 | 0.998340 | 0.997408 | 0.994182 | 0.989693 | 0.983970 |
| 1.50 | 0.999228 | 0.998629 | 0.997861 | 0.995209 | 0.991535 | 0.986881 |
| 1.75 | 0.999459 | 0.999040 | 0.998503 | 0.996651 | 0.994095 | 0.990871 |
| 2.00 | 0.999693 | 0.999456 | 0.999151 | 0.998106 | 0.996670 | 0.994873 |
| 2.50 | 1.000084 | 1.000149 | 1.000234 | 1.000534 | 1.000967 | 1.001547 |
| 3.00 | 1.000361 | 1.000642 | 1.001003 | 1.002259 | 1.004021 | 1.006296 |
| 4.00 | 1.000690 | 1.001226 | 1.001915 | 1.004309 | 1.007658 | 1.011962 |
| 6.00 | 1.000961 | 1.001707 | 1.002668 | 1.006001 | 1.010664 | 1.016656 |
| 8.00 | 1.001063 | 1.001890 | 1.002952 | 1.006640 | 1.011802 | 1.018436 |
| 10.00 | 1.001113 | 1.001977 | 1.003088 | 1.006945 | 1.012345 | 1.019285 |

# TABLE II-A SHORT SOLENOID RATIOS

L = 0.500

| p \ T | 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000019 | 1.000042 | 1.000075 | 1.000117 | 1.000168 | 1.000299 |
| 0.10 | 1.000018 | 1.000041 | 1.000073 | 1.000113 | 1.000163 | 1.000290 |
| 0.20 | 1.000017 | 1.000037 | 1.000066 | 1.000103 | 1.000148 | 1.000264 |
| 0.40 | 1.000009 | 1.000021 | 1.000038 | 1.000059 | 1.000085 | 1.000152 |
| 0.60 | 0.999998 | 0.999996 | 0.999992 | 0.999988 | 0.999983 | 0.999969 |
| 0.80 | 0.999986 | 0.999968 | 0.999944 | 0.999912 | 0.999873 | 0.999774 |
| 1.00 | 0.999977 | 0.999949 | 0.999910 | 0.999859 | 0.999797 | 0.999639 |
| 1.25 | 0.999975 | 0.999943 | 0.999898 | 0.999841 | 0.999771 | 0.999593 |
| 1.50 | 0.999978 | 0.999950 | 0.999912 | 0.999862 | 0.999801 | 0.999647 |
| 1.75 | 0.999984 | 0.999964 | 0.999936 | 0.999900 | 0.999855 | 0.999743 |
| 2.00 | 0.999990 | 0.999979 | 0.999962 | 0.999940 | 0.999914 | 0.999847 |
| 2.50 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 3.00 | 1.000010 | 1.000022 | 1.000038 | 1.000060 | 1.000086 | 1.000153 |
| 4.00 | 1.000019 | 1.000043 | 1.000076 | 1.000119 | 1.000171 | 1.000304 |
| 6.00 | 1.000028 | 1.000061 | 1.000107 | 1.000167 | 1.000240 | 1.000427 |
| 8.00 | 1.000034 | 1.000070 | 1.000119 | 1.000186 | 1.000267 | 1.000473 |
| 10.00 | 1.000038 | 1.000074 | 1.000126 | 1.000196 | 1.000280 | 1.000496 |

| p \ T | 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000672 | 1.001196 | 1.001869 | 1.004211 | 1.007501 | 1.011749 |
| 0.10 | 1.000653 | 1.001162 | 1.001816 | 1.004093 | 1.007291 | 1.011424 |
| 0.20 | 1.000594 | 1.001057 | 1.001652 | 1.003724 | 1.006637 | 1.010405 |
| 0.40 | 1.000341 | 1.000607 | 1.000949 | 1.002136 | 1.003801 | 1.005947 |
| 0.60 | 0.999930 | 0.999874 | 0.999801 | 0.999539 | 0.999145 | 0.998593 |
| 0.80 | 0.999491 | 0.999093 | 0.998581 | 0.996784 | 0.994229 | 0.990872 |
| 1.00 | 0.999188 | 0.998555 | 0.997741 | 0.994907 | 0.990918 | 0.985756 |
| 1.25 | 0.999085 | 0.998374 | 0.997461 | 0.994296 | 0.989884 | 0.984242 |
| 1.50 | 0.999205 | 0.998589 | 0.997797 | 0.995064 | 0.991273 | 0.986463 |
| 1.75 | 0.999422 | 0.998975 | 0.998400 | 0.996420 | 0.993686 | 0.990233 |
| 2.00 | 0.999656 | 0.999390 | 0.999049 | 0.997875 | 0.996263 | 0.994240 |
| 2.50 | 1.000057 | 1.000102 | 1.000161 | 1.000370 | 1.000677 | 1.001096 |
| 3.00 | 1.000344 | 1.000612 | 1.000956 | 1.002154 | 1.003836 | 1.006008 |
| 4.00 | 1.000683 | 1.001214 | 1.001896 | 1.004266 | 1.007582 | 1.011843 |
| 6.00 | 1.000959 | 1.001705 | 1.002663 | 1.005990 | 1.010646 | 1.016628 |
| 8.00 | 1.001063 | 1.001888 | 1.002950 | 1.006637 | 1.011796 | 1.018426 |
| 10.00 | 1.001113 | 1.001976 | 1.003087 | 1.006944 | 1.012342 | 1.019281 |

# TABLE II-A SHORT SOLENOID RATIOS

L = 0.600

| p | T 0.010 | 0.015 | 0.020 | 0.025 | 0.030 | 0.040 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000015 | 1.000033 | 1.000059 | 1.000092 | 1.000133 | 1.000236 |
| 0.10 | 1.000015 | 1.000033 | 1.000058 | 1.000091 | 1.000131 | 1.000233 |
| 0.20 | 1.000014 | 1.000031 | 1.000055 | 1.000086 | 1.000124 | 1.000221 |
| 0.40 | 1.000010 | 1.000022 | 1.000039 | 1.000061 | 1.000088 | 1.000157 |
| 0.60 | 1.000002 | 1.000004 | 1.000006 | 1.000010 | 1.000014 | 1.000025 |
| 0.80 | 0.999991 | 0.999979 | 0.999962 | 0.999941 | 0.999915 | 0.999848 |
| 1.00 | 0.999981 | 0.999957 | 0.999924 | 0.999881 | 0.999828 | 0.999695 |
| 1.25 | 0.999976 | 0.999945 | 0.999903 | 0.999848 | 0.999781 | 0.999611 |
| 1.50 | 0.999977 | 0.999949 | 0.999910 | 0.999859 | 0.999797 | 0.999638 |
| 1.75 | 0.999983 | 0.999961 | 0.999931 | 0.999892 | 0.999845 | 0.999725 |
| 2.00 | 0.999989 | 0.999976 | 0.999957 | 0.999933 | 0.999903 | 0.999827 |
| 2.50 | 1.000001 | 1.000002 | 1.000003 | 1.000004 | 1.000006 | 1.000011 |
| 3.00 | 1.000009 | 1.000020 | 1.000036 | 1.000056 | 1.000081 | 1.000144 |
| 4.00 | 1.000019 | 1.000042 | 1.000075 | 1.000117 | 1.000169 | 1.000300 |
| 6.00 | 1.000028 | 1.000061 | 1.000107 | 1.000167 | 1.000240 | 1.000426 |
| 8.00 | 1.000032 | 1.000068 | 1.000119 | 1.000186 | 1.000267 | 1.000473 |
| 10.00 | 1.000034 | 1.000075 | 1.000126 | 1.000195 | 1.000279 | 1.000495 |

| p | T 0.060 | 0.080 | 0.100 | 0.150 | 0.200 | 0.250 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000532 | 1.000946 | 1.001478 | 1.003324 | 1.005907 | 1.009223 |
| 0.10 | 1.000524 | 1.000931 | 1.001455 | 1.003274 | 1.005820 | 1.009092 |
| 0.20 | 1.000496 | 1.000882 | 1.001379 | 1.003105 | 1.005526 | 1.008645 |
| 0.40 | 1.000354 | 1.000629 | 1.000984 | 1.002218 | 1.003956 | 1.006207 |
| 0.60 | 1.000056 | 1.000100 | 1.000155 | 1.000345 | 1.000604 | 1.000924 |
| 0.80 | 0.999658 | 0.999390 | 0.999045 | 0.997834 | 0.996107 | 0.993830 |
| 1.00 | 0.999313 | 0.998777 | 0.998088 | 0.995682 | 0.992285 | 0.987868 |
| 1.25 | 0.999124 | 0.998443 | 0.997567 | 0.994528 | 0.990281 | 0.984831 |
| 1.50 | 0.999187 | 0.998555 | 0.997745 | 0.994942 | 0.991050 | 0.986101 |
| 1.75 | 0.999381 | 0.998901 | 0.998286 | 0.996163 | 0.993227 | 0.989515 |
| 2.00 | 0.999612 | 0.999311 | 0.998926 | 0.997601 | 0.995776 | 0.993484 |
| 2.50 | 1.000025 | 1.000044 | 1.000070 | 1.000167 | 1.000318 | 1.000539 |
| 3.00 | 1.000323 | 1.000575 | 1.000898 | 1.002024 | 1.003606 | 1.005650 |
| 4.00 | 1.000674 | 1.001198 | 1.001872 | 1.004212 | 1.007487 | 1.011695 |
| 6.00 | 1.000957 | 1.001701 | 1.002657 | 1.005978 | 1.010624 | 1.016593 |
| 8.00 | 1.001062 | 1.001887 | 1.002948 | 1.006633 | 1.011789 | 1.018415 |
| 10.00 | 1.001112 | 1.001975 | 1.003086 | 1.006942 | 1.012339 | 1.019276 |

## TABLE II-B MAGNETIC FIELD vs. AXIAL POSITION
(Short Solenoid Values)

Values of $U_S$ calculated from (20) are tabulated (see section 3G for discussion). The same relative dimensions occur in this table as were used in Table II-A except that the thickness parameter T does not enter since this is a calculation for ideal elements. The format is similar to that used in Table II-A. Rows are identified by the position parameter p running from 00 through 10.00 and columns are headed by the length parameter L (refer to title page preceding Table II-A).

**EXAMPLE:** It is desired to find $U_S$ at point P for the ideal solenoid equivalent to the thick solenoid used in the example at the beginning of Table II-B. By reference to the earlier example it is seen that

Radius $R = 5$ cm

Half-length $\lambda = 2$ cm

Axial displacement $X = 15$ cm

and

$L = 0.400$

$p = 3.000$

To find the value look in the row opposite 3.000 and in the column under 0.400. The value of $U_S$ is 0.035030. In other words, for an ideal solenoid of this geometry and at the axial point P specified, the magnetic field is 3.5030% of the value of the magnetic field at the center of the solenoid.

TABLE II-B MAGNETIC FIELD vs. AXIAL POSITION
(Short Solenoid Values)

| p \ L | 0.125 | 0.150 | 0.175 | 0.200 | 0.206 | 0.208 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 0.10 | 0.985629 | 0.985818 | 0.986036 | 0.986282 | 0.986345 | 0.986366 |
| 0.20 | 0.944478 | 0.945166 | 0.945964 | 0.946864 | 0.947094 | 0.947172 |
| 0.40 | 0.804925 | 0.806871 | 0.809138 | 0.811712 | 0.812374 | 0.812598 |
| 0.60 | 0.636559 | 0.639190 | 0.642275 | 0.645802 | 0.646713 | 0.647022 |
| 0.80 | 0.481999 | 0.484565 | 0.487588 | 0.491064 | 0.491965 | 0.492270 |
| 1.00 | 0.358386 | 0.360512 | 0.363024 | 0.365922 | 0.366674 | 0.366930 |
| 1.25 | 0.247216 | 0.248730 | 0.250521 | 0.252592 | 0.253131 | 0.253314 |
| 1.50 | 0.173025 | 0.174061 | 0.175288 | 0.176707 | 0.177076 | 0.177202 |
| 1.75 | 0.123734 | 0.124443 | 0.125283 | 0.126254 | 0.126506 | 0.126592 |
| 2.00 | 0.090562 | 0.091056 | 0.091640 | 0.092316 | 0.092491 | 0.092551 |
| 2.50 | 0.051810 | 0.052066 | 0.052370 | 0.052721 | 0.052812 | 0.052843 |
| 3.00 | 0.031956 | 0.032103 | 0.032276 | 0.032476 | 0.032528 | 0.032545 |
| 4.00 | 0.014402 | 0.014462 | 0.014532 | 0.014613 | 0.014634 | 0.014641 |
| 6.00 | 0.004481 | 0.004498 | 0.004518 | 0.004541 | 0.004547 | 0.004549 |
| 8.00 | 0.001924 | 0.001931 | 0.001939 | 0.001948 | 0.001951 | 0.001952 |
| 10.00 | 0.000993 | 0.000997 | 0.001001 | 0.001005 | 0.001007 | 0.001007 |

| p \ L | 0.210 | 0.212 | 0.214 | 0.216 | 0.218 | 0.220 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 0.10 | 0.986387 | 0.986409 | 0.986431 | 0.986453 | 0.986475 | 0.986497 |
| 0.20 | 0.947251 | 0.947330 | 0.947410 | 0.947490 | 0.947571 | 0.947652 |
| 0.40 | 0.812824 | 0.813052 | 0.813281 | 0.813513 | 0.813746 | 0.813981 |
| 0.60 | 0.647334 | 0.647648 | 0.647965 | 0.648285 | 0.648608 | 0.648933 |
| 0.80 | 0.492579 | 0.492891 | 0.493205 | 0.493523 | 0.493843 | 0.494166 |
| 1.00 | 0.367188 | 0.367449 | 0.367712 | 0.367978 | 0.368246 | 0.368517 |
| 1.25 | 0.253499 | 0.253686 | 0.253874 | 0.254065 | 0.254257 | 0.254451 |
| 1.50 | 0.177329 | 0.177457 | 0.177586 | 0.177717 | 0.177848 | 0.177981 |
| 1.75 | 0.126679 | 0.126767 | 0.126855 | 0.126945 | 0.127035 | 0.127126 |
| 2.00 | 0.092611 | 0.092672 | 0.092734 | 0.092796 | 0.092859 | 0.092922 |
| 2.50 | 0.052874 | 0.052906 | 0.052937 | 0.052970 | 0.053002 | 0.053035 |
| 3.00 | 0.032563 | 0.032581 | 0.032599 | 0.032618 | 0.032636 | 0.032655 |
| 4.00 | 0.014648 | 0.014656 | 0.014663 | 0.014670 | 0.014678 | 0.014685 |
| 6.00 | 0.004551 | 0.004553 | 0.004555 | 0.004557 | 0.004559 | 0.004561 |
| 8.00 | 0.001952 | 0.001953 | 0.001954 | 0.001955 | 0.001956 | 0.001957 |
| 10.00 | 0.001008 | 0.001008 | 0.001008 | 0.001009 | 0.001009 | 0.001010 |

TABLE II-B MAGNETIC FIELD vs. AXIAL POSITION
(Short Solenoid Values)

| p \ L | 0.250 | 0.300 | 0.350 | 0.400 | 0.500 | 0.600 |
|---|---|---|---|---|---|---|
| 0.00 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 0.10 | 0.986847 | 0.987491 | 0.988194 | 0.988934 | 0.990451 | 0.991919 |
| 0.20 | 0.948937 | 0.951316 | 0.953925 | 0.956691 | 0.962415 | 0.968021 |
| 0.40 | 0.817711 | 0.824712 | 0.832544 | 0.841021 | 0.859174 | 0.877775 |
| 0.60 | 0.654127 | 0.664033 | 0.675364 | 0.687942 | 0.716030 | 0.746577 |
| 0.80 | 0.499348 | 0.509359 | 0.521024 | 0.534250 | 0.564916 | 0.600216 |
| 1.00 | 0.372871 | 0.381352 | 0.391355 | 0.402861 | 0.430261 | 0.463179 |
| 1.25 | 0.257578 | 0.263700 | 0.270975 | 0.279422 | 0.299905 | 0.325288 |
| 1.50 | 0.180127 | 0.184334 | 0.189346 | 0.195183 | 0.209431 | 0.227306 |
| 1.75 | 0.128593 | 0.131471 | 0.134898 | 0.138889 | 0.148635 | 0.160885 |
| 2.00 | 0.093942 | 0.095939 | 0.098315 | 0.101078 | 0.107808 | 0.116242 |
| 2.50 | 0.053563 | 0.054595 | 0.055818 | 0.057234 | 0.060660 | 0.064909 |
| 3.00 | 0.032955 | 0.033541 | 0.034232 | 0.035030 | 0.036948 | 0.039302 |
| 4.00 | 0.014807 | 0.015042 | 0.015319 | 0.015637 | 0.016394 | 0.017309 |
| 6.00 | 0.004595 | 0.004661 | 0.004738 | 0.004826 | 0.005033 | 0.005280 |
| 8.00 | 0.001971 | 0.001998 | 0.002029 | 0.002065 | 0.002150 | 0.002250 |
| 10.00 | 0.001017 | 0.001030 | 0.001046 | 0.001064 | 0.001107 | 0.001157 |

## TABLE III-A THICK LOOP RATIOS

Values of $Q_\lambda$ calculated from (19) are tabulated for the following relative dimensions (see section 3D and 3F for discussion). The thick loops calculated are by definition elements having square cross-sections and so only two dimensional parameters are necessary.

Thickness Parameter $T = t/R$ takes the following values.

| | | |
|---|---|---|
| 0.02 | 0.10 | 0.18 |
| 0.04 | 0.12 | 0.20 |
| 0.06 | 0.14 | 0.22 |
| 0.08 | 0.16 | 0.24 |

Position Parameter $p = X/R$. In this table values of $Q_\lambda$ are computed for each value of T at 60 points equi-spaced along the axis from the point p = 0.04 to the point p = 2.40 (i.e. the increment in p between any two consecutive points is 0.04).

---

NOTE: The quantities X,R, and t are the actual dimensions of the loop (see figure 2).

---

EXAMPLE: Given a thick loop having the following dimensions:

Thickness = 6.4 cm

Outside diameter = 46.4 cm

Inside diameter = 33.6 cm

Find $Q_\lambda$ at a point P on the axis of this loop and located 16 cm from the center.

From the given dimensions:

Mean radius R = 20 cm

Half-thickness t = 3.2 cm

Axial displacement X = 16 cm

Therefore:

$$T = t/R = 0.16$$

$$p = X/R = 0.80$$

To find the value look in column under 0.16 and row opposite 0.80. The value of Q is 1.000847. In other words, for a thick loop of this geometry and at the axial point P specified, the magnetic field is 0.0847% greater than the field produced at the same point by the equivalent ideal solenoid.

## TABLE III-A THICK LOOP RATIOS

| p \ T | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 |
|---|---|---|---|---|---|---|
| 0.04 | 0.999934 | 0.999734 | 0.999398 | 0.998922 | 0.998300 | 0.997526 |
| 0.08 | 0.999935 | 0.999737 | 0.999407 | 0.998938 | 0.998327 | 0.997567 |
| 0.12 | 0.999936 | 0.999744 | 0.999421 | 0.998965 | 0.998372 | 0.997634 |
| 0.16 | 0.999938 | 0.999753 | 0.999442 | 0.999002 | 0.998432 | 0.997726 |
| 0.20 | 0.999941 | 0.999764 | 0.999467 | 0.999049 | 0.998507 | 0.997838 |
| 0.24 | 0.999944 | 0.999777 | 0.999497 | 0.999103 | 0.998595 | 0.997970 |
| 0.28 | 0.999948 | 0.999791 | 0.999531 | 0.999165 | 0.998694 | 0.998118 |
| 0.32 | 0.999952 | 0.999808 | 0.999568 | 0.999233 | 0.998803 | 0.998279 |
| 0.36 | 0.999956 | 0.999825 | 0.999608 | 0.999305 | 0.998919 | 0.998451 |
| 0.40 | 0.999961 | 0.999844 | 0.999651 | 0.999382 | 0.999041 | 0.998629 |
| 0.44 | 0.999966 | 0.999864 | 0.999695 | 0.999461 | 0.999166 | 0.998813 |
| 0.48 | 0.999971 | 0.999884 | 0.999740 | 0.999543 | 0.999295 | 0.999000 |
| 0.52 | 0.999976 | 0.999904 | 0.999787 | 0.999626 | 0.999425 | 0.999189 |
| 0.56 | 0.999981 | 0.999925 | 0.999833 | 0.999709 | 0.999555 | 0.999377 |
| 0.60 | 0.999986 | 0.999946 | 0.999880 | 0.999792 | 0.999685 | 0.999563 |
| 0.64 | 0.999992 | 0.999966 | 0.999927 | 0.999874 | 0.999813 | 0.999748 |
| 0.68 | 0.999997 | 0.999987 | 0.999972 | 0.999955 | 0.999939 | 0.999929 |
| 0.72 | 1.000002 | 1.000007 | 1.000018 | 1.000035 | 1.000063 | 1.000106 |
| 0.76 | 1.000006 | 1.000027 | 1.000062 | 1.000113 | 1.000185 | 1.000279 |
| 0.80 | 1.000012 | 1.000046 | 1.000105 | 1.000190 | 1.000303 | 1.000447 |
| 0.84 | 1.000016 | 1.000065 | 1.000147 | 1.000263 | 1.000417 | 1.000611 |
| 0.88 | 1.000021 | 1.000083 | 1.000187 | 1.000335 | 1.000528 | 1.000769 |
| 0.92 | 1.000025 | 1.000100 | 1.000226 | 1.000404 | 1.000636 | 1.000922 |
| 0.96 | 1.000029 | 1.000117 | 1.000264 | 1.000471 | 1.000739 | 1.001070 |
| 1.00 | 1.000034 | 1.000133 | 1.000301 | 1.000536 | 1.000839 | 1.001212 |
| 1.04 | 1.000037 | 1.000149 | 1.000336 | 1.000598 | 1.000935 | 1.001349 |
| 1.08 | 1.000041 | 1.000164 | 1.000369 | 1.000657 | 1.001027 | 1.001481 |
| 1.12 | 1.000044 | 1.000178 | 1.000402 | 1.000714 | 1.001116 | 1.001608 |
| 1.16 | 1.000048 | 1.000192 | 1.000433 | 1.000769 | 1.001201 | 1.001729 |
| 1.20 | 1.000051 | 1.000206 | 1.000462 | 1.000821 | 1.001282 | 1.001845 |
| 1.24 | 1.000054 | 1.000218 | 1.000490 | 1.000871 | 1.001360 | 1.001957 |
| 1.28 | 1.000057 | 1.000230 | 1.000517 | 1.000919 | 1.001435 | 1.002064 |
| 1.32 | 1.000060 | 1.000242 | 1.000543 | 1.000965 | 1.001506 | 1.002166 |
| 1.36 | 1.000063 | 1.000252 | 1.000568 | 1.001008 | 1.001574 | 1.002264 |
| 1.40 | 1.000065 | 1.000263 | 1.000591 | 1.001050 | 1.001639 | 1.002357 |
| 1.44 | 1.000068 | 1.000273 | 1.000614 | 1.001090 | 1.001701 | 1.002446 |
| 1.48 | 1.000071 | 1.000282 | 1.000635 | 1.001128 | 1.001761 | 1.002532 |
| 1.52 | 1.000073 | 1.000291 | 1.000656 | 1.001164 | 1.001817 | 1.002613 |
| 1.56 | 1.000075 | 1.000300 | 1.000675 | 1.001199 | 1.001871 | 1.002691 |
| 1.60 | 1.000078 | 1.000309 | 1.000694 | 1.001232 | 1.001923 | 1.002766 |
| 1.64 | 1.000079 | 1.000316 | 1.000711 | 1.001264 | 1.001973 | 1.002837 |
| 1.68 | 1.000081 | 1.000324 | 1.000728 | 1.001294 | 1.002020 | 1.002905 |
| 1.72 | 1.000082 | 1.000331 | 1.000745 | 1.001323 | 1.002065 | 1.002970 |

## TABLE III-A THICK LOOP RATIOS

| T / p | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 |
|---|---|---|---|---|---|---|
| 0.04 | 0.996592 | 0.995486 | 0.994199 | 0.992718 | 0.991029 | 0.989118 |
| 0.08 | 0.996651 | 0.995568 | 0.994310 | 0.992863 | 0.991217 | 0.989358 |
| 0.12 | 0.996747 | 0.995702 | 0.994489 | 0.993100 | 0.991523 | 0.989746 |
| 0.16 | 0.996878 | 0.995882 | 0.994732 | 0.993419 | 0.991933 | 0.990267 |
| 0.20 | 0.997039 | 0.996104 | 0.995029 | 0.993808 | 0.992433 | 0.990898 |
| 0.24 | 0.997227 | 0.996362 | 0.995372 | 0.994254 | 0.993005 | 0.991619 |
| 0.28 | 0.997436 | 0.996648 | 0.995751 | 0.994746 | 0.993631 | 0.992403 |
| 0.32 | 0.997663 | 0.996955 | 0.996157 | 0.995269 | 0.994293 | 0.993230 |
| 0.36 | 0.997903 | 0.997279 | 0.996581 | 0.995813 | 0.994978 | 0.994079 |
| 0.40 | 0.998152 | 0.997613 | 0.997016 | 0.996367 | 0.995670 | 0.994933 |
| 0.44 | 0.998407 | 0.997952 | 0.997455 | 0.996923 | 0.996361 | 0.995778 |
| 0.48 | 0.998665 | 0.998294 | 0.997895 | 0.997475 | 0.997042 | 0.996605 |
| 0.52 | 0.998923 | 0.998634 | 0.998330 | 0.998018 | 0.997707 | 0.997408 |
| 0.56 | 0.999180 | 0.998971 | 0.998758 | 0.998549 | 0.998354 | 0.998182 |
| 0.60 | 0.999434 | 0.999302 | 0.999177 | 0.999066 | 0.998979 | 0.998927 |
| 0.64 | 0.999683 | 0.999627 | 0.999586 | 0.999569 | 0.999584 | 0.999642 |
| 0.68 | 0.999928 | 0.999945 | 0.999984 | 1.000056 | 1.000167 | 1.000329 |
| 0.72 | 1.000167 | 1.000254 | 1.000371 | 1.000527 | 1.000730 | 1.000988 |
| 0.76 | 1.000401 | 1.000555 | 1.000747 | 1.000984 | 1.001273 | 1.001623 |
| 0.80 | 1.000627 | 1.000847 | 1.001111 | 1.001426 | 1.001798 | 1.002235 |
| 0.84 | 1.000847 | 1.001130 | 1.001464 | 1.001854 | 1.002305 | 1.002825 |
| 0.88 | 1.001060 | 1.001404 | 1.001805 | 1.002267 | 1.002796 | 1.003395 |
| 0.92 | 1.001266 | 1.001669 | 1.002135 | 1.002667 | 1.003270 | 1.003947 |
| 0.96 | 1.001464 | 1.001925 | 1.002454 | 1.003054 | 1.003729 | 1.004481 |
| 1.00 | 1.001656 | 1.002172 | 1.002762 | 1.003428 | 1.004172 | 1.004998 |
| 1.04 | 1.001840 | 1.002410 | 1.003059 | 1.003789 | 1.004601 | 1.005498 |
| 1.08 | 1.002018 | 1.002639 | 1.003345 | 1.004137 | 1.005016 | 1.005982 |
| 1.12 | 1.002189 | 1.002860 | 1.003621 | 1.004473 | 1.005416 | 1.006451 |
| 1.16 | 1.002353 | 1.003072 | 1.003887 | 1.004797 | 1.005803 | 1.006904 |
| 1.20 | 1.002510 | 1.003276 | 1.004142 | 1.005109 | 1.006175 | 1.007341 |
| 1.24 | 1.002661 | 1.003471 | 1.004388 | 1.005409 | 1.006535 | 1.007764 |
| 1.28 | 1.002805 | 1.003659 | 1.004623 | 1.005698 | 1.006881 | 1.008172 |
| 1.32 | 1.002944 | 1.003839 | 1.004850 | 1.005975 | 1.007214 | 1.008564 |
| 1.36 | 1.003076 | 1.004011 | 1.005067 | 1.006241 | 1.007534 | 1.008943 |
| 1.40 | 1.003203 | 1.004176 | 1.005275 | 1.006497 | 1.007842 | 1.009307 |
| 1.44 | 1.003324 | 1.004334 | 1.005474 | 1.006742 | 1.008137 | 1.009657 |
| 1.48 | 1.003440 | 1.004485 | 1.005665 | 1.006977 | 1.008421 | 1.009994 |
| 1.52 | 1.003551 | 1.004630 | 1.005848 | 1.007203 | 1.008694 | 1.010318 |
| 1.56 | 1.003657 | 1.004769 | 1.006023 | 1.007419 | 1.008955 | 1.010628 |
| 1.60 | 1.003759 | 1.004901 | 1.006191 | 1.007626 | 1.009205 | 1.010926 |
| 1.64 | 1.003856 | 1.005028 | 1.006351 | 1.007824 | 1.009445 | 1.011212 |
| 1.68 | 1.003948 | 1.005149 | 1.006505 | 1.008014 | 1.009675 | 1.011486 |
| 1.72 | 1.004037 | 1.005265 | 1.006652 | 1.008196 | 1.009896 | 1.011749 |

## TABLE III-A THICK LOOP RATIOS

| T | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 |
|---|---|---|---|---|---|---|
| p | | | | | | |
| 1.76 | 1.000085 | 1.000338 | 1.000760 | 1.001350 | 1.002108 | 1.003032 |
| 1.80 | 1.000086 | 1.000344 | 1.000775 | 1.001377 | 1.002149 | 1.003091 |
| 1.84 | 1.000088 | 1.000351 | 1.000789 | 1.001402 | 1.002188 | 1.003148 |
| 1.88 | 1.000089 | 1.000357 | 1.000802 | 1.001426 | 1.002226 | 1.003203 |
| 1.92 | 1.000091 | 1.000363 | 1.000815 | 1.001449 | 1.002262 | 1.003254 |
| 1.96 | 1.000093 | 1.000368 | 1.000828 | 1.001471 | 1.002296 | 1.003304 |
| 2.00 | 1.000094 | 1.000373 | 1.000839 | 1.001492 | 1.002329 | 1.003352 |
| 2.04 | 1.000095 | 1.000378 | 1.000851 | 1.001512 | 1.002361 | 1.003397 |
| 2.08 | 1.000096 | 1.000383 | 1.000862 | 1.001531 | 1.002391 | 1.003441 |
| 2.12 | 1.000097 | 1.000388 | 1.000872 | 1.001549 | 1.002420 | 1.003483 |
| 2.16 | 1.000099 | 1.000392 | 1.000882 | 1.001567 | 1.002448 | 1.003523 |
| 2.20 | 1.000098 | 1.000396 | 1.000891 | 1.001584 | 1.002474 | 1.003561 |
| 2.24 | 1.000100 | 1.000400 | 1.000901 | 1.001600 | 1.002500 | 1.003598 |
| 2.28 | 1.000102 | 1.000404 | 1.000909 | 1.001616 | 1.002524 | 1.003633 |
| 2.32 | 1.000102 | 1.000408 | 1.000918 | 1.001631 | 1.002547 | 1.003667 |
| 2.36 | 1.000101 | 1.000412 | 1.000926 | 1.001645 | 1.002570 | 1.003699 |
| 2.40 | 1.000105 | 1.000415 | 1.000933 | 1.001659 | 1.002592 | 1.003731 |

## TABLE III-A THICK LOOP RATIOS

| T / p | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 |
|---|---|---|---|---|---|---|
| 1.76 | 1.004122 | 1.005376 | 1.006792 | 1.008370 | 1.010107 | 1.012001 |
| 1.80 | 1.004203 | 1.005482 | 1.006927 | 1.008536 | 1.010309 | 1.012243 |
| 1.84 | 1.004280 | 1.005583 | 1.007055 | 1.008696 | 1.010503 | 1.012475 |
| 1.88 | 1.004354 | 1.005680 | 1.007179 | 1.008849 | 1.010689 | 1.012696 |
| 1.92 | 1.004425 | 1.005773 | 1.007297 | 1.008995 | 1.010866 | 1.012909 |
| 1.96 | 1.004493 | 1.005862 | 1.007410 | 1.009135 | 1.011037 | 1.013113 |
| 2.00 | 1.004558 | 1.005947 | 1.007518 | 1.009269 | 1.011200 | 1.013308 |
| 2.04 | 1.004620 | 1.006029 | 1.007622 | 1.009398 | 1.011356 | 1.013495 |
| 2.08 | 1.004680 | 1.006107 | 1.007721 | 1.009521 | 1.011506 | 1.013675 |
| 2.12 | 1.004737 | 1.006181 | 1.007816 | 1.009639 | 1.011650 | 1.013847 |
| 2.16 | 1.004791 | 1.006253 | 1.007907 | 1.009752 | 1.011788 | 1.014012 |
| 2.20 | 1.004844 | 1.006322 | 1.007995 | 1.009861 | 1.011920 | 1.014170 |
| 2.24 | 1.004894 | 1.006388 | 1.008079 | 1.009965 | 1.012047 | 1.014322 |
| 2.28 | 1.004942 | 1.006451 | 1.008159 | 1.010065 | 1.012168 | 1.014468 |
| 2.32 | 1.004988 | 1.006512 | 1.008236 | 1.010161 | 1.012285 | 1.014607 |
| 2.36 | 1.005033 | 1.006570 | 1.008310 | 1.010253 | 1.012397 | 1.014742 |
| 2.40 | 1.005076 | 1.006626 | 1.008382 | 1.010341 | 1.012505 | 1.014871 |

## TABLE III-B MAGNETIC FIELD vs. AXIAL POSITION
(Loop Values)

Values of $U_\lambda$ calculated from (21) are tabulated (see section 3G for discussion). The only parameter in this table is the position parameter p since in this case T = L = 0. The same values of p occur in this table as were used in Table III-A.

**EXAMPLE:** It is desired to find $U_\lambda$ at the point P for the ideal loop equivalent to the thick loop used in the example at the beginning of Table III-A. By reference to the earlier example it is seen that

Radius R = 20 cm

Axial displacement X = 16 cm

and

p = 0.80

To find the value look opposite 0.80. The value of $U_\lambda$ is 0.476140. In other words, for an ideal loop at the axial point P specified, the magnetic field is 47.6140% of the value of the magnetic field at the center of the loop.

TABLE III-B MAGNETIC FIELD vs. AXIAL POSITION
(Loop Values)

| p | $U_s$ | p | $U_s$ |
|---|---|---|---|
| 0.00 | 1.000000 | 1.84 | 0.108882 |
| 0.04 | 0.997605 | 1.88 | 0.103567 |
| 0.08 | 0.990476 | 1.92 | 0.098569 |
| 0.12 | 0.978782 | 1.96 | 0.093868 |
| 0.16 | 0.962793 | 2.00 | 0.089443 |
| 0.20 | 0.942866 | 2.04 | 0.085275 |
| 0.24 | 0.919428 | 2.08 | 0.081348 |
| 0.28 | 0.892956 | 2.12 | 0.077646 |
| 0.32 | 0.863955 | 2.16 | 0.074153 |
| 0.36 | 0.832939 | 2.20 | 0.070857 |
| 0.40 | 0.800411 | 2.24 | 0.067743 |
| 0.44 | 0.766852 | 2.28 | 0.064801 |
| 0.48 | 0.732707 | 2.32 | 0.062019 |
| 0.52 | 0.698376 | 2.36 | 0.059387 |
| 0.56 | 0.664210 | 2.40 | 0.056896 |
| 0.60 | 0.630510 | 2.44 | 0.054536 |
| 0.64 | 0.597525 | 2.48 | 0.052300 |
| 0.68 | 0.565458 | 2.52 | 0.050180 |
| 0.72 | 0.534467 | 2.56 | 0.048169 |
| 0.76 | 0.504667 | 2.60 | 0.046260 |
| 0.80 | 0.476140 | 2.64 | 0.044447 |
| 0.84 | 0.448936 | 2.68 | 0.042725 |
| 0.88 | 0.423080 | 2.72 | 0.041087 |
| 0.92 | 0.398576 | 2.76 | 0.039529 |
| 0.96 | 0.375410 | 2.80 | 0.038047 |
| 1.00 | 0.353553 | 2.84 | 0.036636 |
| 1.04 | 0.332969 | 2.88 | 0.035291 |
| 1.08 | 0.313612 | 2.92 | 0.034010 |
| 1.12 | 0.295429 | 2.96 | 0.032788 |
| 1.16 | 0.278368 | 3.00 | 0.031623 |
| 1.20 | 0.262371 | 3.04 | 0.030510 |
| 1.24 | 0.247380 | 3.08 | 0.029448 |
| 1.28 | 0.233340 | 3.12 | 0.028434 |
| 1.32 | 0.220193 | 3.16 | 0.027464 |
| 1.36 | 0.207885 | 3.20 | 0.026537 |
| 1.40 | 0.196364 | 3.24 | 0.025650 |
| 1.44 | 0.185579 | 3.28 | 0.024801 |
| 1.48 | 0.175482 | 3.32 | 0.023989 |
| 1.52 | 0.166027 | 3.36 | 0.023211 |
| 1.56 | 0.157172 | 3.40 | 0.022465 |
| 1.60 | 0.148876 | 3.44 | 0.021751 |
| 1.64 | 0.141101 | 3.48 | 0.021066 |
| 1.68 | 0.133812 | 3.52 | 0.020408 |
| 1.72 | 0.126976 | 3.56 | 0.019778 |
| 1.76 | 0.120561 | 3.60 | 0.019172 |
| 1.80 | 0.114538 | 3.64 | 0.018591 |

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